User Manual 602

D-Series Serial Bus System

DeviceNet™ and MODBUS TCP

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Table of Contents

***DeviceNet*™** is a trademark used under license by ODVA.

Important User Information

Solid state equipment has operational characteristics differing from those of electromechanical equipment. *Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls (Form #A10325)* (available online at www.rosscontrols.com), describes some important differences between solid state equipment and hard-wired electromechanical devices. Because of these differences, and also because of the wide variety of uses for solid state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

In no event will ROSS CONTROLS® be responsible or liable for indirect or consequential damages to persons or property resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, ROSS CONTROLS® cannot assume responsibility or liability for actual use based on the examples and diagrams.

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Throughout this manual we use notes to make you aware of safety considerations.

ATTENTION

Environment and Enclosure

This equipment is intended for use in overvoltage Category II applications (as defined in IEC publication 60664-1), at altitudes up to 2000 meters without derating. This equipment is considered Group 1, Class A industrial equipment according to IEC/CISPR Publication 11. Without appropriate precautions, there may be potential difficulties ensuring electromagnetic compatibility in other environments due to conducted as well as radiated disturbance. This equipment is supplied as “enclosed” equipment. It should not require additional system enclosure when used in locations consistent with the enclosure type ratings stated in the Specifications section of this publication. Subsequent sections of this publication may contain additional information regarding specific enclosure type ratings, beyond what this product provides, that are required to comply with certain product safety certifications.

NOTE: See NEMA Standards publication 250 and IEC publication 60529, as applicable, for explanations of the degrees of protection provided by different types of enclosures. Also, see the appropriate sections in this publication, as well as the publication A10324 (“Industrial Automation Wiring and Grounding Guidelines”), for additional installation requirements pertaining to this equipment.

ATTENTION

Preventing Electrostatic Discharge

This equipment is sensitive to electrostatic discharge, which can cause internal damage and affect normal operation. Follow these guidelines when you handle this equipment:

- Touch a grounded object to discharge potential static.
- Wear an approved grounding wrist strap.
- Do not touch connectors or pins on component boards.
- Do not touch circuit components inside the equipment.
- If available, use a static-safe workstation.
- When not in use, store the equipment in appropriate static safe packaging.

Configuration Start-up

Assembly of Hardware Components

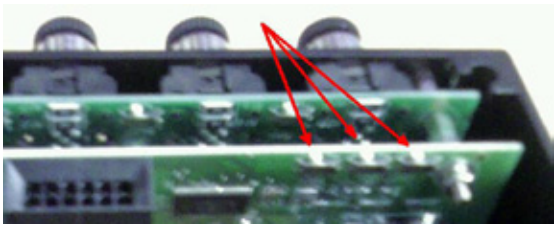
Before completing the assembly of hardware components (valves, manifolds, I/O modules, etc.), make sure the following tasks have been completed.

a. Set switch addresses for all I/O modules. If using only one piece of a given module part number, the factory default setting can be used. If using more then one module with the same part number, each module needs to be addressed differently. Factory default is AAA. See I/O reference page for complete address chart.

Modbus TCP Module Addressing:

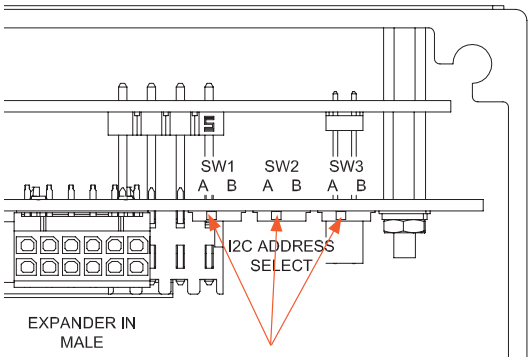
1. Before assembling the D-Series modules, locate the addressing dip switches.
2. Create a list of the modules you wish to use. Group them by the type of module. Place them in order as listed below. (This is not required but it makes organizing your modules and addresses easier).

All DIN 8 Modules
All DIN 16 Modules
All DOUT 8 Modules
All DIO 8 Modules
All Relay 4 Modules
All DOUT 24 Modules
All AIN 2 Modules
All AOUT 2 Modules



3. The modules have been set at the factory with the 3 dip switches in the "A" position. If there is no other I/O modules of this type the dip switches may not need setting, however if there is another module of similar type it will be necessary to modify the address switches.

There is a chart on the right with an example of the dip switch settings and their address.



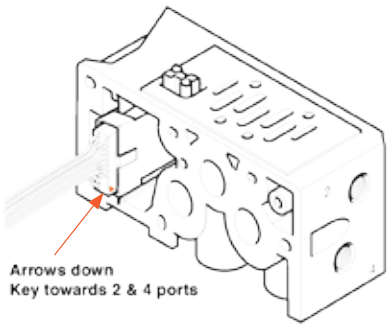
b. Set switch addresses for all communication modules. If using serial communications, the switches configure the address. For TCP configuration, if a static IP address is set in the software that has the last octet set to "0", then the switches configure the last octet of the IP address. Factory default is address 0, all switches off. See Modbus Address reference page for complete address chart.

c. Insert SD Card in Communication Module. If blank, all configuration programming will automatically write to the SD card. Once the configuration is complete, an option to save the configuration to the module memory is available. If the SD Card is already configured, the save to memory option can be used or the module can be run directly from the SD Card.

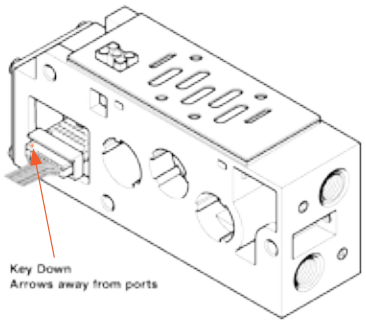
12C Address Selection

SW #	Hexidecimal Address							
	E0	E2	E4	E6	E8	EA	EC	EE
SW1	A	B	A	B	A	B	A	B
SW2	A	A	B	B	A	A	B	B
SW3	A	A	A	A	B	B	B	B

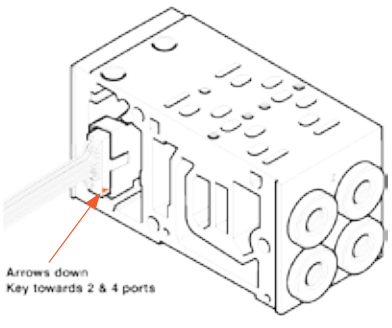
When connecting the ribbon cable to the valve manifold, connect the 2x10 connector first and the 1x10 connector second. Make sure the arrows on the side of each connector point in the same direction, arrows up.



ISO 1
Ribbon Cable RPS4024P



ISO 2 & 3
Ribbon Cable RPS4024P

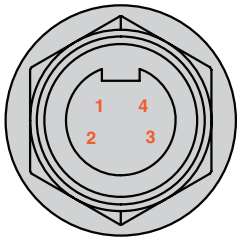


ISO 0 & 00
Ribbon Cable RPS5624P

Configuration Start-up

Connecting the Power and Communication Cables

Connect to the 4 pin Power Connector. See pinout in figure 1.
Connect to the Communication Connector. On the *DeviceNet*™ module, use either the male or female *DeviceNet*™ port. On the Modbus TCP module, use the Ethernet port. Alternatively the RS-232/RS-485 port can be selected if using serial communication. See figures 2a & 2b.



POWER CONNECTOR PINOUT
PIN 1 - Black wire - +24 volts I/O IN
PIN 2 - Blue wire - PE
PIN 3 - Brown wire - Common
PIN 4 - White wire - +24 volts Logic IN

Figure 1

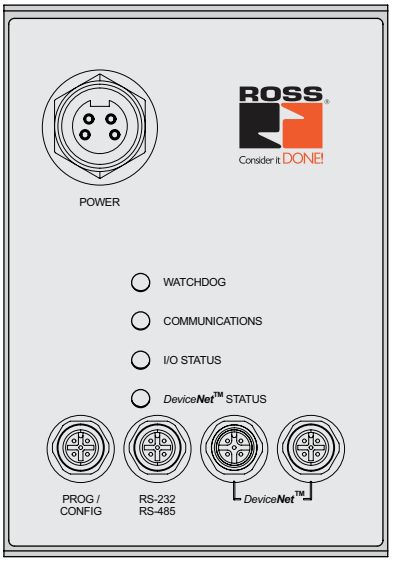


Figure 2a
RRSSCDM12A

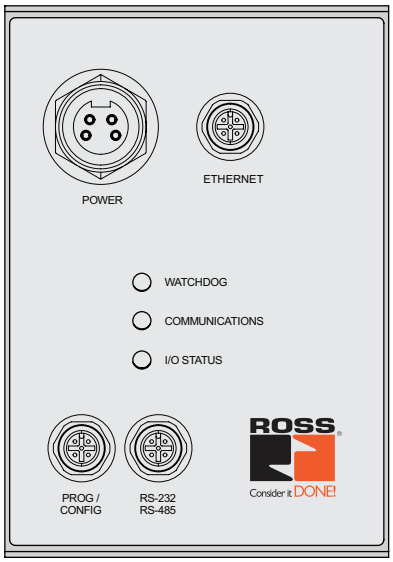
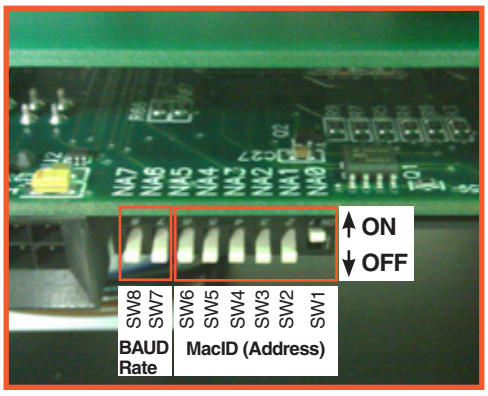


Figure 2b
RRSSCENXXA

Model: RRSSCDM12A
Address and Baude Rate Configuration

Note:
As shown, the MacID is 01 and the Baude rate is 125K.



Serial Bus Configuration Tool

Downloading the Software

Go to www.rosscontrols.com to download the D Series Configuration Tool Program. This program is needed for both the *DeviceNet*™ and Modbus TCP communication modules.
If using the *DeviceNet*™ module, also download the D Series EDS File. If using the Modbus TCP module, refer to the Register Mapping Appendix.

Configuring the Module

For *DeviceNet*™ modules, connect to the Prog/Config port. For Modbus TCP modules, connect to the Prog/Config or the Ethernet port. See figures 2a & 2b.

Install D Series Configuration Tool Program. Run Setup.exe. Open Program.

Connect to Serial Bus Valve Controller

To open the Ross Serial Bus Valve Controller Configuration Tool:

1. Click Start
2. Click Programs
3. Click ROSS Controls
4. Click Serial Bus
5. Click Config Tool
   The program will open (see figure 3).

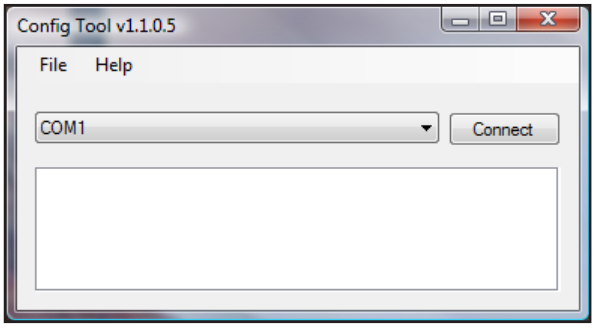


Figure 3

Select the Connection Port and Connect to the Controller:

Using the drop down, select the desired connection Port:

a. For connections using the Serial Configuration Cable (ROSS P/N: RR158H58).

b. Select RS232 Communications port connected to D-Series System (see figure 4).

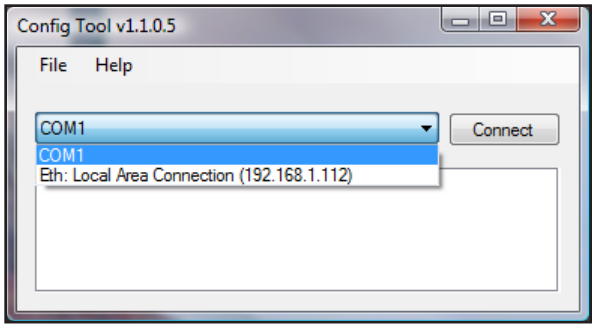


Figure 4

Click the Connect button to connect to the controller.
The Config Tool Master screen will open (see figure 5).

For connections using the computer's Ethernet port when the computer and D-Series system are connected to a common Ethernet network:

Select: Eth: Local Area Connection (or appropriate network adapter).

A list of all D-Series Systems present on the network will appear.

Select the correct D-Series System (based on MAC, IP Address, or Host Name). Click OK button.

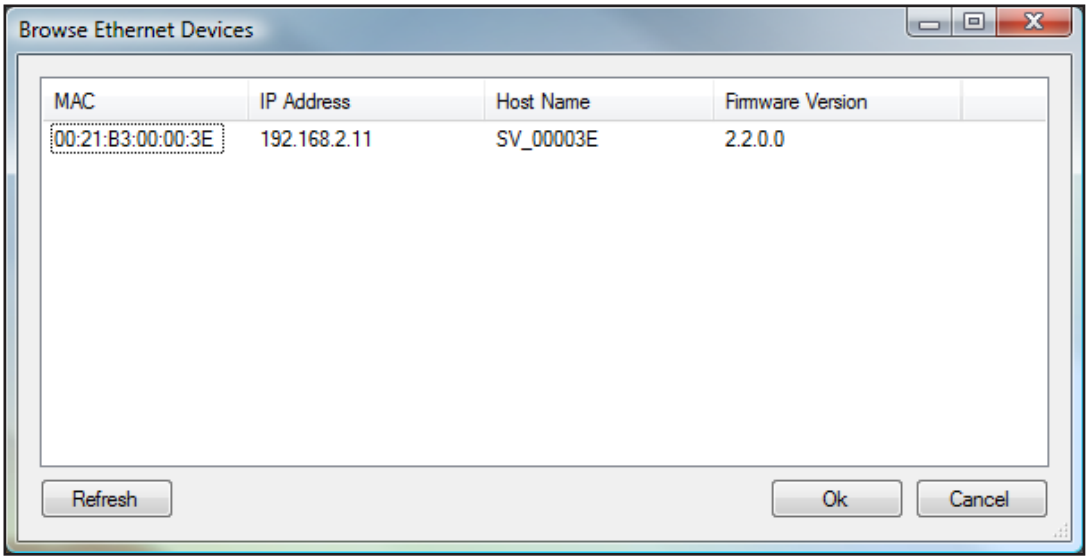


Figure 5

Target Info Tab

If not selected, click on the Target Info tab to select this option (see figure 6).

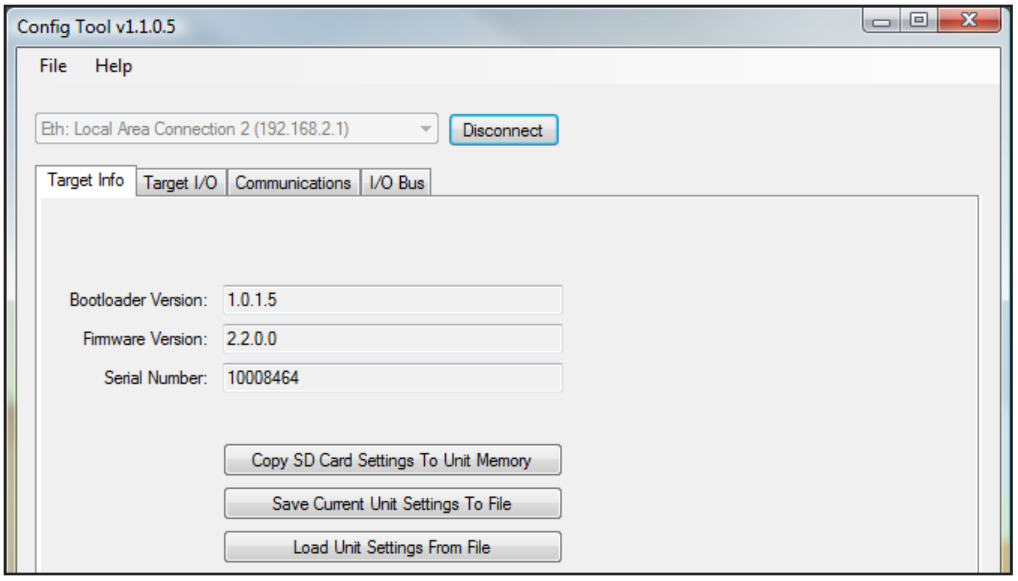


Figure 6

1. **Bootloader Version**
   This displays the currently installed version of the bootloader in the controller. The bootloader acts as a BIOS and allows the Firmware and other features to be loaded and configured.
2. **Firmware Version**
   This displays the currently installed version of the Firmware in the controller. The firmware is similar to an operating system. It provides the functionality that operates in conjunction with the bootloader.
3. **Serial Number**
   This is the factory programmed serial number of the Serial Bus Controller.
4. **Window Tab**
   Shows the currently selected Tab. Other Tabs may be selected by clicking on them.
5. **Disconnect Button**
   Click will disconnect the Configuration Tool from the actual Serial Bus Controller.
6. **Copy SD Card Setting To Unit Memory Button**
   Click will copy D-Series unit settings stored on SD Card installed in D-Series unit to unit's internal memory.
   Clicking this button will bring up the screen on the right (see figure 7).
   This indicates that unit settings were successfully copied from the SD Card installed in the D-Series unit to the unit's internal memory.

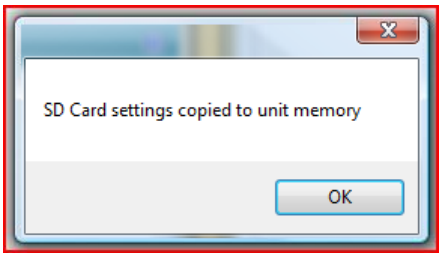


Figure 7

7. **Save Current Unit Settings To File Button**
   Click will save the current D-Series configuration data to a file.
   Clicking this button will bring up the screen on the right (see figure 8).

   This screen allows the user to choose the location to save the .dat file which contains the D-Series unit settings.

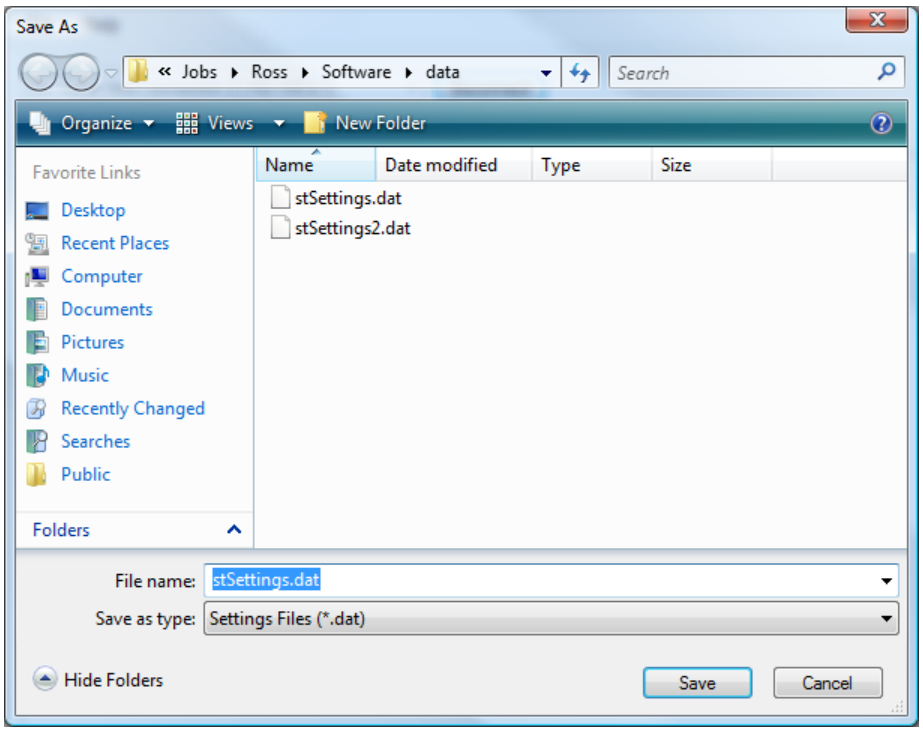


Figure 8

8. Load Unit Settings From File Button

Click to load D-Series configuration from a data file. Note: If a SD Card is installed in the D-Series unit, the settings will be stored only in the SD Card unless the user clicks the “Copy SD Card Settings to Unit Memory” button to manually copy the unit setting from the SD card to the unit’s internal memory.

Clicking this button will bring up the screen on the right (see figure 9).

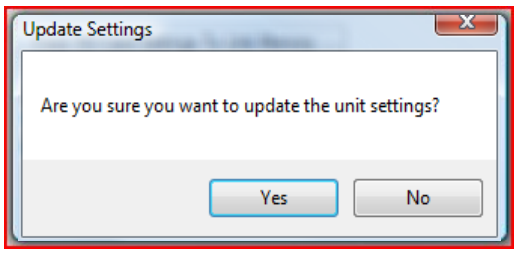


Figure 9

Click YES to confirm that new settings are to be written to the D-Series unit. A file-open screen will then be displayed (see figure 10).

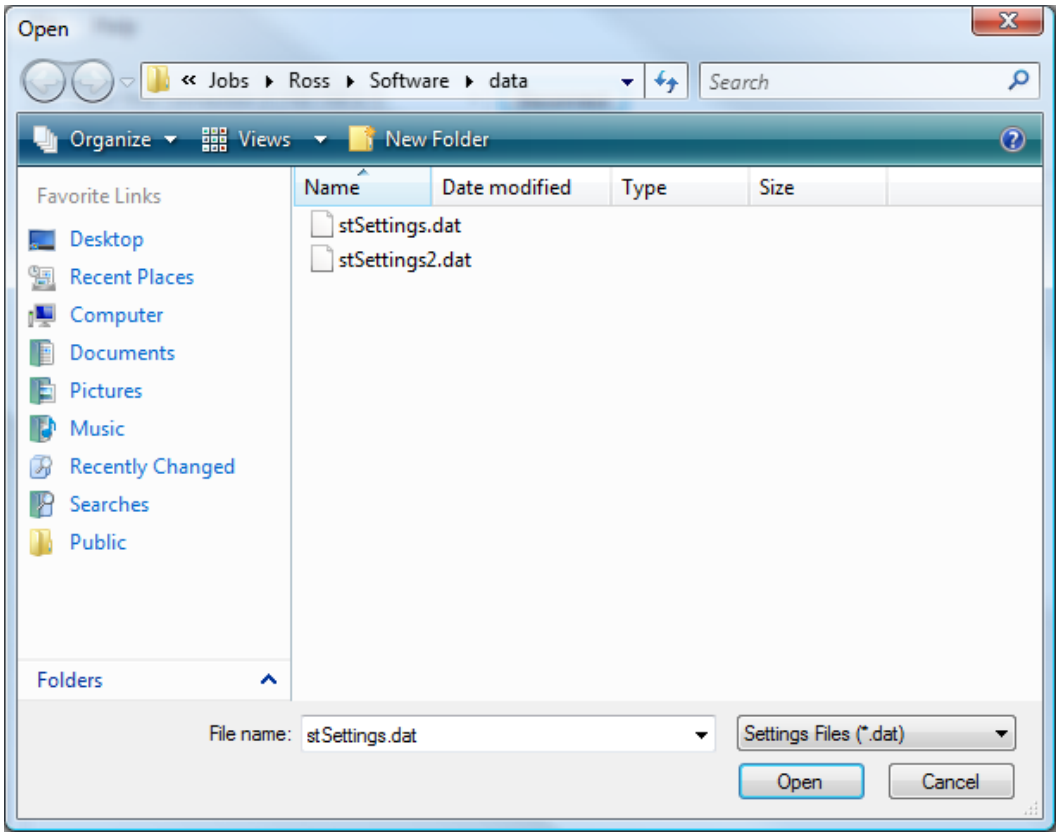


Figure 10

Select the .dat file containing the unit settings to be loaded into the D-Series unit. The setting in this file will then be loaded into the D-Series unit. Note: If a SD Card is installed in the D-Series unit, the settings will be stored only in the SD Card unless the user clicks the “Copy SD Card Settings to Unit Memory” button to manually copy the unit setting from the SD card to the unit’s internal memory.

NOTE: If a unit settings .dat file loaded on an SD card installed in the D-Series unit is determined to be invalid, the red I/O Status LED will flash at 5 Hz. The unit will not operate until a valid configuration is loaded to the SD card (or the SD card is removed).

Target I/O Tab

This tab is used for controlling and viewing controller I/O (directly controlled, not via bus). If not selected, click on the Target I/O tab to select this option. Reference next image (see figure 11).

1. **Window Tab** – Shows the currently selected Tab. Other Tabs may be selected by clicking on them.
2. **Solenoid Valve Number (1-24)** – This is the solenoid valve number. There can be up to 24 directly controlled solenoid valves. Use this header to identify the solenoid valve that is to be viewed or controlled.
3. **State** – The State check box is used to control the solenoid valve (1-24). When checked, the solenoid valve is ON or turns ON immediately. When unchecked, the solenoid valve is OFF or turns OFF immediately.
4. **Valve Status** – This status box displays current status of Solenoid Valve (1-24). The status can be Open, Normal, or Shorted. The valve status is only valid when the valve state is OFF.
5. **Active –** Solenoid valve active check box determines if the valve status information (for the specific valve) is used in internal logic to set the I/O STATUS LED on the controller. If Active is checked, the valve status is included in determining the status of the I/O STATUS LED. If Active is not checked, the valve status is ignored and does not affect the I/O STATUS LED status. Any changes to the Active check box will not take effect until the Apply button is clicked.
6. **Default** – The default check box determines the state of the Solenoid Valve in the event all Communications is lost. When checked, if all communications is lost, the solenoid valve will be ON or turn ON. If not checked, the loss of all communications will cause the solenoid valve to be OFF or turn OFF. Any changes to the Default check box will not take effect until the Apply button is clicked.
7. **Apply Button** – Causes any changes made to the Default or Active check boxes to take effect.

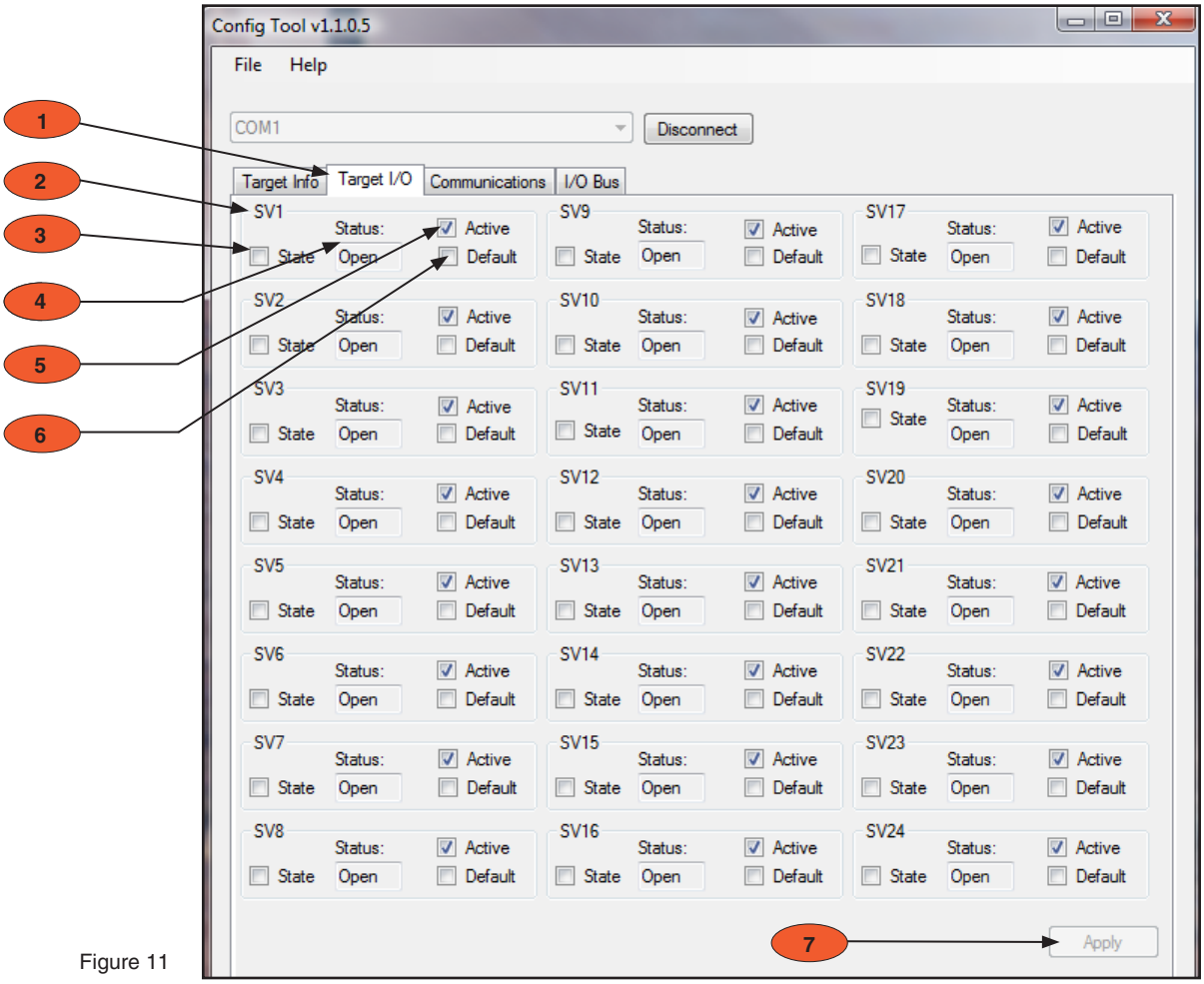


Figure 11

Communications Tab

This tab is used for configuring the communications ports and protocols. If not selected, click on the Communications tab to select this option.
Reference image on the right (see figure 12). Using the drop down menu, the communications protocol is selected and configured.

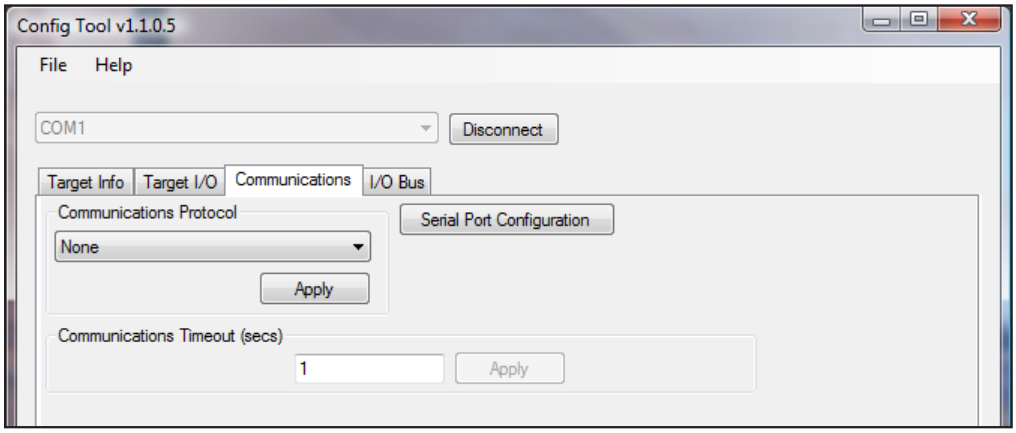


Figure 12

A. Select Modbus RTU, ASCII or Modbus TCP using the drop down menu. The Modbus RTU or ASCII refers to communications via the Serial Port (RS-232/RS-485). Modbus TCP refers to communications via the Ethernet port.
Reference image on the right (see figure 13).

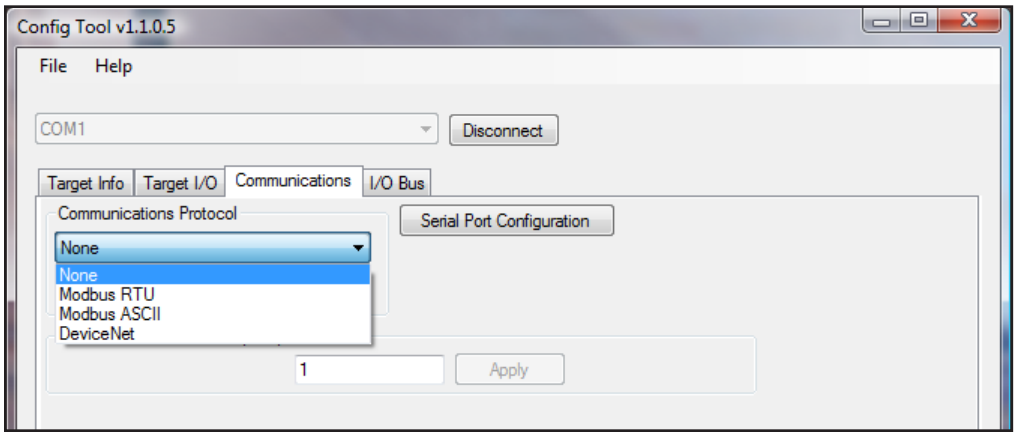


Figure 13

The Modbus communications settings will appear. Reference image below (see figure 14).

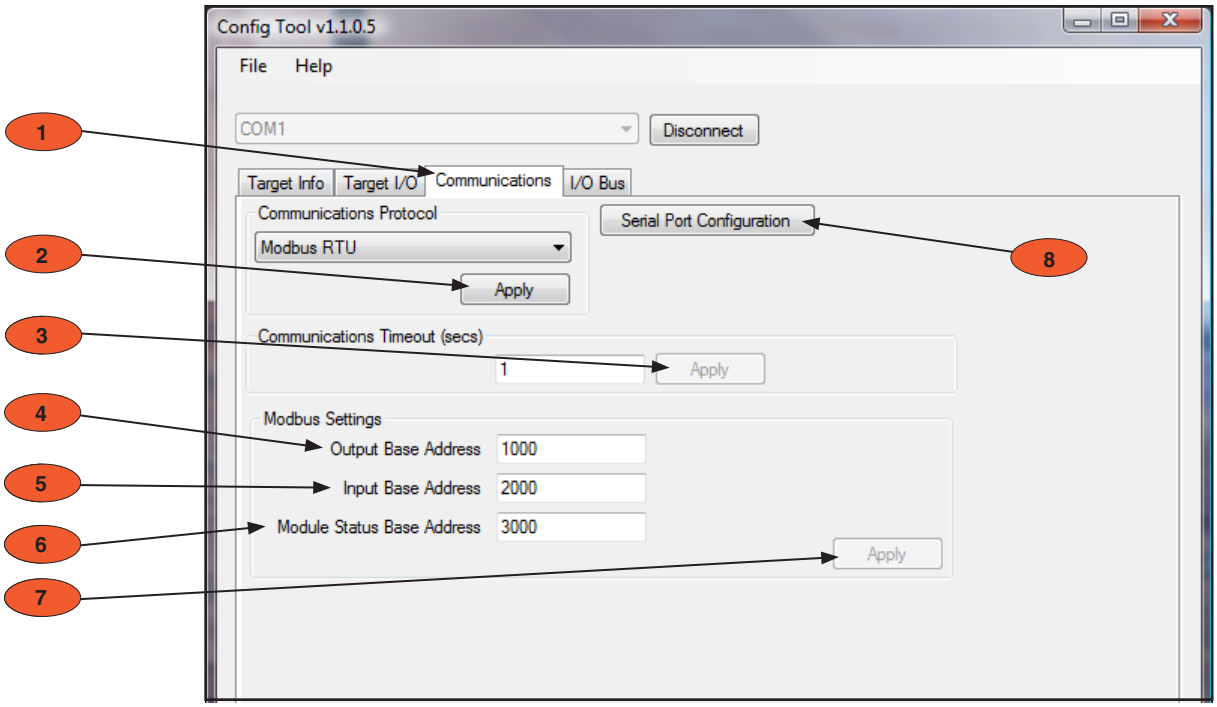


Figure 14

Window Tab – Shows the currently selected Tab. Other Tabs may be selected by clicking on them.

1. **Selected Communications Protocol (Drop down Menu)** – This displays the currently selected communications protocol (None, *DeviceNet*™, Modbus ASCII, Modbus RTU). Currently, Modbus RTU is selected (Modbus ASCII shares the same configuration). Power to the controller must be cycled if the Communications Protocol is changed before the change will take effect.
2. **Communications Protocol Apply Button** – Clicking this button applies the currently selected protocol (in this case it would apply Modbus RTU).
3. **Communications Timeout (and Apply Button)** – This text box is where the communications timeout is entered. The time value (in seconds) is used to determine if communications is lost. If communications are lost for this amount of time, the I/O is set to the default state. Clicking the Apply button will apply the current entered value to the controller.
4. **Output Base Address (Modbus**) – Base address of the output holding registers.
5. **Input Base Address (Modbus)** – Base address of the input holding registers.
6. **Module Status Base Address (Modbus)** – Base address of the module status holding registers.
7. **Modbus Settings Apply Button (Modbus)** – This button will apply the currently displayed Modbus settings to the controller.
8. **Serial Port Configuration Button (Modbus RTU or ASCII only)** – Clicking the Serial Port Configuration button will open the Serial Configuration Window (new window) to configure the serial port settings. Reference image below (see figure 15).

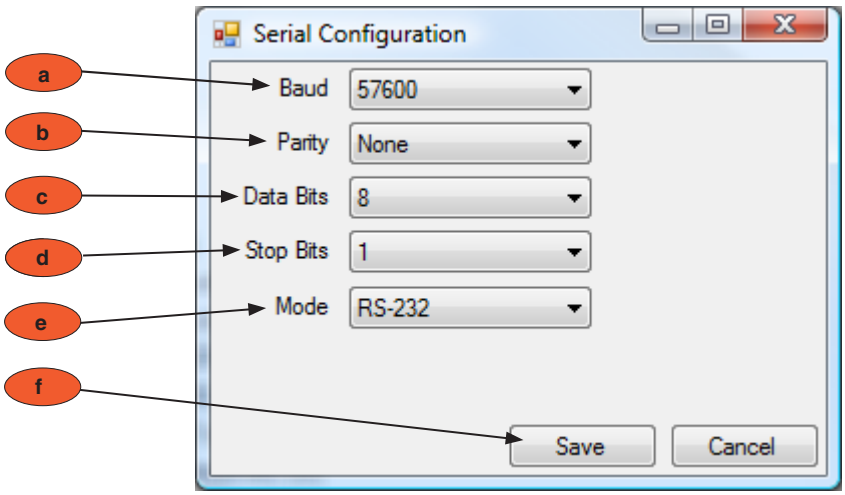


Figure 15

a. Baud Rate – This is where the serial baud rate is selected using the drop down menu. The range is 9600 to 115200 bps. The default baud rate is 57600.

b. Parity – This is where the serial packet parity is selected using the drop down menu. The choices are NONE, ODD and EVEN. NONE is the default parity.

c. Data Bits – This is where the number of data bits is selected using the drop down menu. The choices are 5-8. The default number of data bits is 8.

d. Stop Bits – This is where the number of stop bits is selected using the drop down menu. The choices are 1 or 2. The default number of stop bits is 1.

e. Communications Mode – This is where the type of serial communications is selected using the drop down menu. The choices are RS-232 or RS-485. The default mode is RS-232.

f. Save Button – The Save button saves the current serial port settings, closes the Serial Configuration Window and returns focus back to the Communications Tab. Power to the controller must be cycled if the Serial Port Configuration Settings are changed before the changes will take effect.

9. Ethernet Options Button (Modbus TCP only)

Clicking the Ethernet Options Configuration button will open the Ethernet Options Window (new window) to configure the serial port settings. Reference image below (see figure 16).

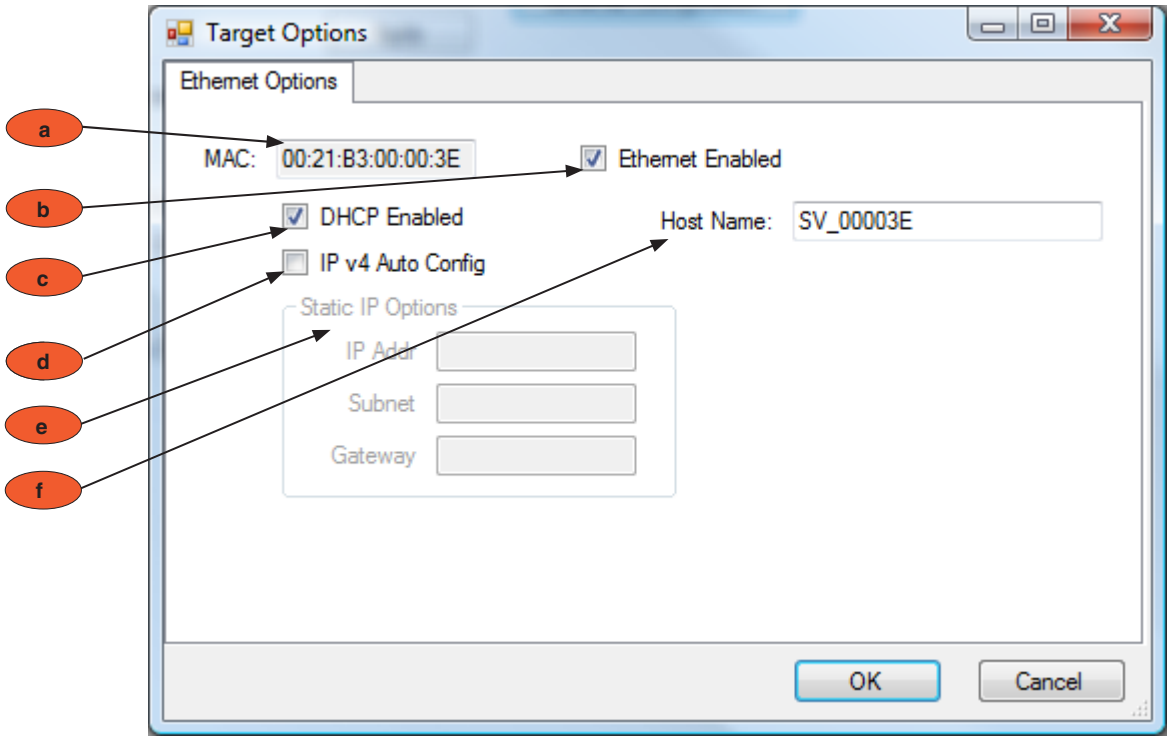


Figure 16

a. MAC – The Ethernet MAC Address of the unit. This is the physical address of the unit set at the factory, this cannot be changed.

b. Ethernet Enabled – Enables (checked) or disables (unchecked) the Ethernet Interface.

c. DHCP Enabled – When checked the unit will acquire an IP Address from a DHCP server on the network

d. IP v4 Auto Config – When checked the unit will automatically configure its IP Address using 169.254/16 prefix see, http://www.faqs.org/rfcs/rfc3927.html.

   Use this option when neither DHCP nor Static IP can be used. This will ensure that all units have a unique IP Address. Units that Auto Configure will have an IP address in the following range: [169.254.1.0 to 169.254.254.255].

e. Static IP Options – When both DHCP and IP v4 Auto Config are disabled the user may enter the IP configuration manually. Talk to your network administrator in order to determine what values to use.
   Note: If a static IP address is used and set to X.X.X.0, the DIP switches on the unit will set the last octet of the IP address (X represents the numerical IP Address Valves 0-255).

f. Host Name – The name used on the network by the unit. The factory default will be SB_ (Serial Bus) followed by the last three octets of the MAC address. This name should be unique.

B. Select *DeviceNet*™ using the drop down menu. *DeviceNet*™ refers to communications via the *DeviceNet*™ Port Reference image below (see figure 17).

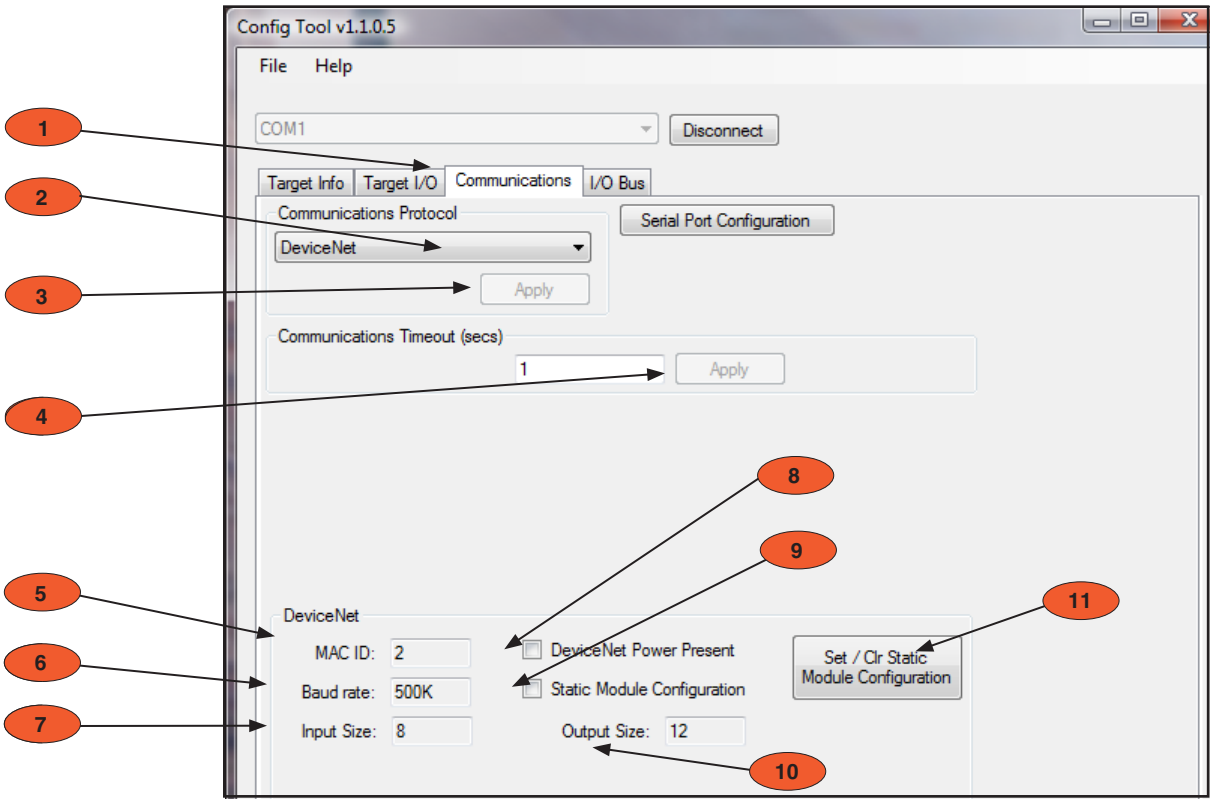


Figure 17

1. **Window Tab** – Shows the currently selected Tab. Other Tabs may be selected by clicking on them.
2. **Selected Communications Protocol (Drop down Menu)** – This displays the currently selected communications protocol (None, *DeviceNet* ™, Modbus ASCII, Modbus RTU). Currently, *DeviceNet* ™ is selected. Power to the controller must be cycled if the Communications Protocol is changed before the change will take effect.
3. **Communications Protocol Apply Button** – Clicking this button applies the currently selected protocol (in this case it would apply *DeviceNet*™).
4. **Communications Timeout (and Apply Button)** – This text box is where the communications timeout is entered. The time value (in seconds) is used to determine if communications is lost. If communications are lost for this amount of time, the I/O is set to the default state. Clicking the Apply button will apply the current entered value to the controller.
5. **TMMAC ID** – *DeviceNet*™ MAC ID. This is a read only. This displays the controllers hardware set address (set by internal DIP switches).
6. **Baud Rate** – *DeviceNet*™ baud rate. This rate is set by internal DIP switches.
7. **Input Size** – Size in bytes of I/O Messaging Input block. This is Assembly Object Class 0, Attribute ID 101. See *DeviceNet*™ Object Model for details.
8. ***DeviceNet*™ Power Present** – This box will be checked when power is detected on the *DeviceNet*™ bus (power pin).
9. **Static Module Configuration** – This checkbox identifies the status of the module: Static or Dynamic.
10. **Output Size** – Size in bytes of I/O Messaging Output block. This is Assembly Object Class 0, Attribute ID 103. See *DeviceNet*™ Object Model for details.
11. **Set/Clr Static Module Configuration Button** – This button will toggle the Static Configuration. When set, it will query, identify and store the connected module settings. When clear, the settings are reset (and the Static Module Configuration Checkbox). ***Note:*** *If the Baud rate switches are both ON during power up, then this will reset the configuration to dynamic.*

I/O Bus Tab

This tab is used for viewing and controlling the Serial Bus I/O. If not selected, click on the I/O Bus tab to select this option. Reference image below (see figure 18).

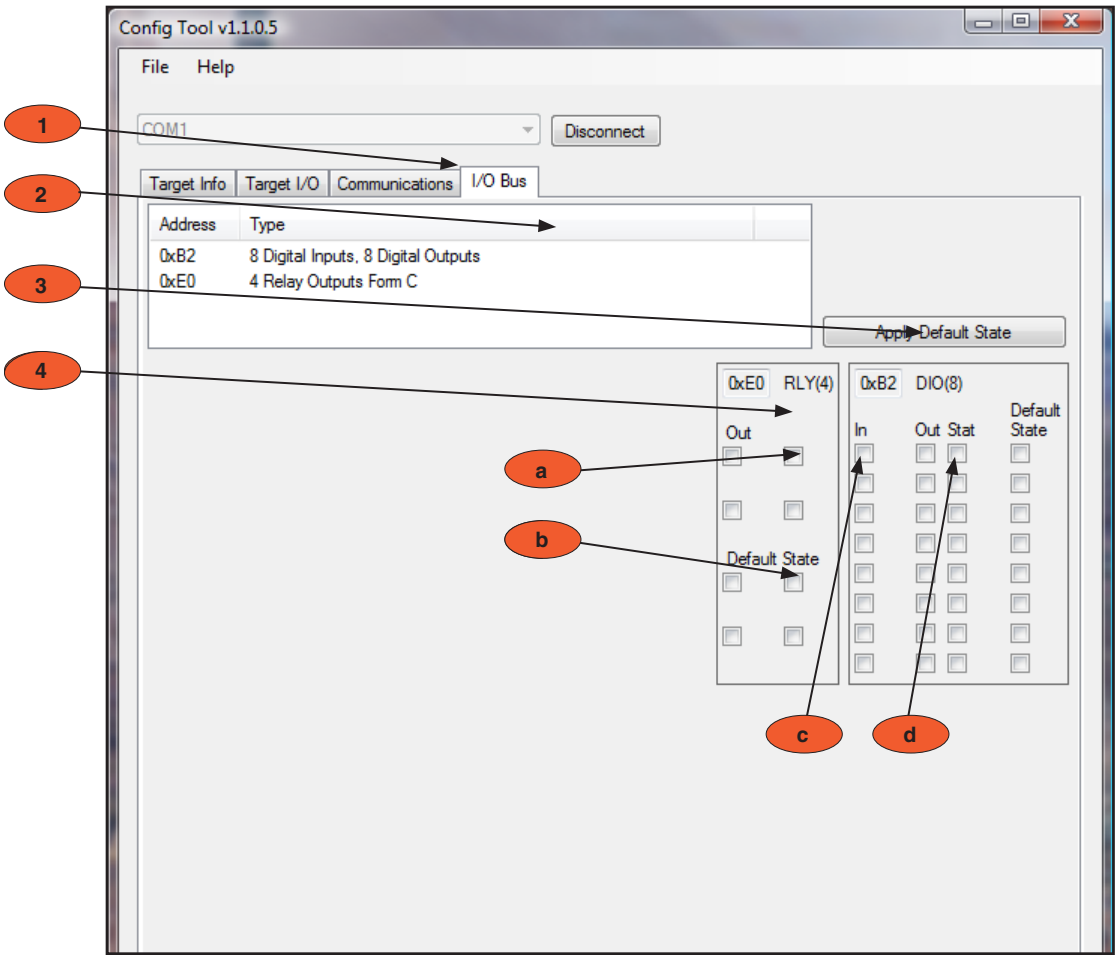


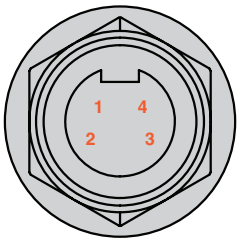
Figure 18

1. Window Tab – Shows the currently selected Tab. Other Tabs may be selected by clicking on them.
2. I/O Bus Window – This window displays the currently connected I/O device modules connected to the serial bus controller (address and description).
3. Apply Default State Button – Clicking this button applies the default states for the connected I/O modules (selected or not selected).
4. I/O Device Module Control Panel – This box provides the viewing and controlling interface for the connected I/O Modules. Each module will have its own individual outlined control box with the address, short description and number of I/O points. Changing the checkboxes will change the corresponding I/O points accordingly.

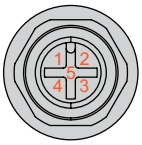
   a. Out Checkbox – This checkbox when clicked active will force the corresponding output point to energize or be ON.
   b. Default State – The default checkbox determines the state of the output in the event all communications is lost. When checked, if all communications is lost, the output will be ON or turn ON. If not checked, the loss of all communications will cause the output to be OFF or turn OFF. Any changes to the Default checkbox will not take effect until the Apply Default State button is clicked.
   c. In Box – The IN box will be checked or true when the actual corresponding digital input point is true or energized.
   d. Stat – The stat checkbox will be true if the Output point is operational and considered 'Normal'. If false, then the output is in one of several modes: Current Limitation, Overtemperature, Undervoltage, Overvoltage, etc.

Communication Module Pinouts

Model Number RRSSCENXXA – MODBUS TCP Communication Module

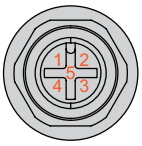


POWER CONNECTOR PINOUT
PIN 1 - Black wire - +24 Volts I/O IN
PIN 2 - Blue wire - PE Ground
PIN 3 - Brown wire - Common
PIN 4 - White wire - +24 Volts Logic IN



PROG/CONFIG

⚠ PRGM/CONFIG PINOUT
PIN 1 - (NO Connection)
PIN 2 - RXD IN
PIN 3 - TXD OUT
PIN 4 - (NO Connection)
PIN 5 - Common



RS-232
RS-485

⚠ RS-232 RS-485 PINOUT
PIN 1 - RS485A
PIN 2 - RXD IN
PIN 3 - TXD OUT
PIN 4 - RS485B
PIN 5 - Common

ETHERNET
D-Code

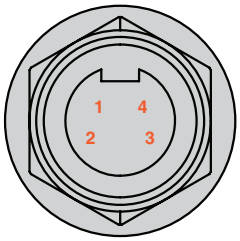
⚠ ETHERNET PINOUT
PIN 1 - TX + OUT
PIN 2 - RX + IN
PIN 3 - TX - OUT
PIN 4 - RX - IN

Notes:
For serial communications, the switches configure the address.
For TCP configuration, if a static IP address is set in the software that has the last octet set to "0", the switches configure the last octet of the IP address.

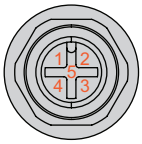
MODBUS Address

Decimal Address	Binary Address SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8
0	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
1	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF
2	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF
.....								
254	OFF	ON	ON	ON	ON	ON	ON	ON
255	ON	ON	ON	ON	ON	ON	ON	ON

Model Number RRSSCDM12A – *DeviceNet*™ Communication Module

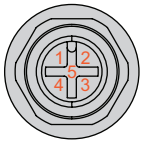


POWER CONNECTOR PINOUT
PIN 1 - Black wire - +24 Volts I/O IN
PIN 2 - Blue wire - PE Ground
PIN 3 - Brown wire - Common
PIN 4 - White wire - +24 Volts Logic IN



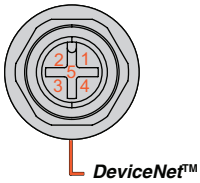
PROG/CONFIG

⚠ PRGM/CONFIG PINOUT
PIN 1 - (NO Connection)
PIN 2 - RXD IN
PIN 3 - TXD OUT
PIN 4 - (NO Connection)
PIN 5 - Common



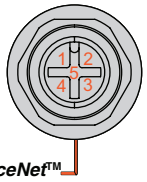
RS-232
RS-485

⚠ RS-232 RS-485 PINOUT
PIN 1 - RS485A
PIN 2 - RXD IN
PIN 3 - TXD OUT
PIN 4 - RS485B
PIN 5 - Common



***DeviceNet*™**

⚠ *DeviceNet*™ PINOUT
PIN 1 - Shield
PIN 2 - +Volts Sense
PIN 3 - Common
PIN 4 - CAN H
PIN 5 - CAN L



***DeviceNet*™**

⚠ *DeviceNet*™ PINOUT
PIN 1 - Shield
PIN 2 - +Volts Sense
PIN 3 - Common
PIN 4 - CAN H
PIN 5 - CAN L

Notes:
For addressing information refer to *DeviceNet*™ object model section at the end of the Manual.

ELECTRICAL SPECIFICATIONS: For product on this page.
Valve Outputs, 24 Total:
Solid State: Current sourcing; 10-28 Volts DC @ 0.5A Max.; Short circuit protection; Fault Detection.
PROG/CONFIG:
Used for configuration and setup.
RS-232/RS-485:
MODBUS ASCII/RTU port.
RS485, RS232 – software selectable.
Baud Rate Selectable.
Ethernet port: *For model* RRSSCENXXA.
Used for MODBUS TCP D-Code.

The device address is set by an 8 position DIP Switch Sets device address as follows:
For MODBUS TCP set last 8 bits of IP address:
ex: 168.192.1.XXX, IP address to be static (user configurable).
For other buses, sets address.
***DeviceNet*™ Port:** *For model* RRSSCDM12A.
Used for *DeviceNet*™ communications.
I/O Expansion Port:
Allows connection to Plug-in I/O modules: Max 256 Digital I/O points; Max 16 Analog I/O points; I2C Interface.
Power Requirements: 24 Volts DC for the I/O, Current Demand is Output Load dependent, 24 Volts DC for the Logic, 50mA Max.

IMPORTANT NOTE: Please read carefully and thoroughly all of the **CAUTIONS** on the inside back cover.

Input/Output Module Pinouts

Model Number RRSSN88M12A – Expansion Module, 8 Digital Inputs/8 Digital Outputs

J1 PINOUT
PIN 1 - +24 Volts
PIN 2 - Input #2
PIN 3 - Common
PIN 4 - Input #1
PIN 5 - (NO Connection)

J2 PINOUT
PIN 1 - +24 Volts
PIN 2 - Input #4
PIN 3 - Common
PIN 4 - Input #3
PIN 5 - (NO Connection)

J3 PINOUT
PIN 1 - +24 Volts
PIN 2 - Input #6
PIN 3 - Common
PIN 4 - Input #5
PIN 5 - (NO Connection)

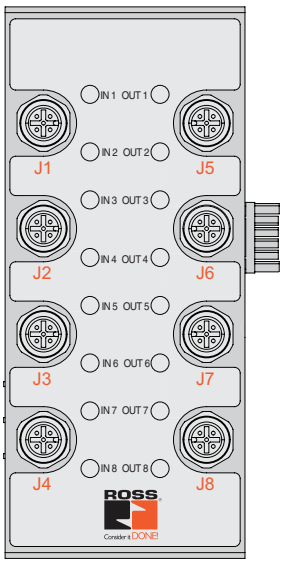
J4 PINOUT
PIN 1 - +24 Volts
PIN 2 - Input #8
PIN 3 - Common
PIN 4 - Input #7
PIN 5 - (NO Connection)

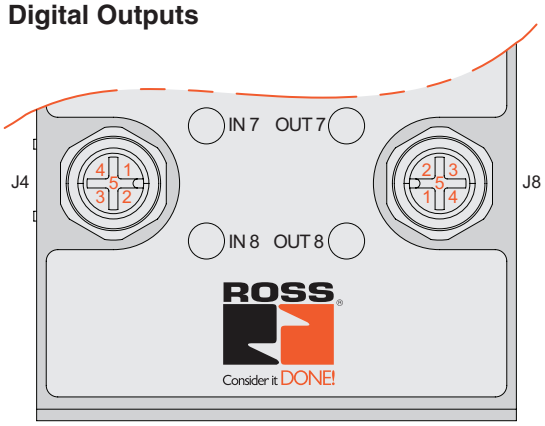
J5 PINOUT
PIN 1 - +24 Volts
PIN 2 - Output #2
PIN 3 - Common
PIN 4 - Output #1
PIN 5 - (NO Connection)

J6 PINOUT
PIN 1 - +24 Volts
PIN 2 - Output #4
PIN 3 - Common
PIN 4 - Output #3
PIN 5 - (NO Connection)

J7 PINOUT
PIN 1 - +24 Volts
PIN 2 - Output #6
PIN 3 - Common
PIN 4 - Output #5
PIN 5 - (NO Connection)

J8 PINOUT
PIN 1 - +24 Volts
PIN 2 - Output #8
PIN 3 - Common
PIN 4 - Output #7
PIN 5 - (NO Connection)





Input Mode Selection

SW#	Input#	Sinking	Sourcing
SW1A	Input 1/2	A	B
SW2A	Input 3/4	A	B
SW3A	Input 5/6	A	B
SW4A	Input 7/8	A	B

12C Address Selection

SW	Hexidecimal Address							
#	B0	B2	B4	B6	B8	BA	BC	BE
SW1	A	B	A	B	A	B	A	B
SW2	A	A	B	B	A	A	B	B
SW3	A	A	A	A	B	B	B	B

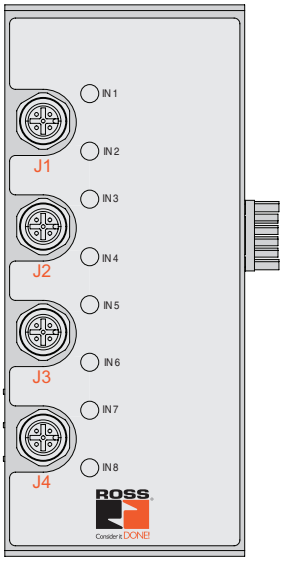
Model Number RRSSN8XM12A – Expansion Module, 8 Digital Inputs

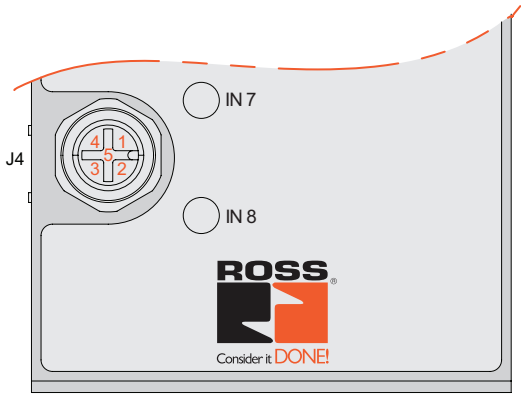
J1 PINOUT
PIN 1 - +24 Volts
PIN 2 - Input #2
PIN 3 - Common
PIN 4 - Input #1
PIN 5 - (NO Connection)

J2 PINOUT
PIN 1 - +24 Volts
PIN 2 - Input #4
PIN 3 - Common
PIN 4 - Input #3
PIN 5 - (NO Connection)

J3 PINOUT
PIN 1 - +24 Volts
PIN 2 - Input #6
PIN 3 - Common
PIN 4 - Input #5
PIN 5 - (NO Connection)

J4 PINOUT
PIN 1 - +24 Volts
PIN 2 - Input #8
PIN 3 - Common
PIN 4 - Input #7
PIN 5 - (NO Connection)





12C Address Selection

SW	Hexidecimal Address							
#	40	42	44	46	48	4A	4C	4E
SW1	A	B	A	B	A	B	A	B
SW2	A	A	B	B	A	A	B	B
SW3	A	A	A	A	B	B	B	B

Input Mode Selection

SW#	Input#	Sinking	Sourcing
SW1A	Input 1/2	A	B
SW2A	Input 3/4	A	B
SW3A	Input 5/6	A	B
SW4A	Input 7/8	A	B

ELECTRICAL SPECIFICATIONS: For product on this page.
Inputs:
Input Voltage Range: 10-28 Volts DC.
Input Current: 9mA Nominal @ 24 Volts DC.
Input Resistance: 5.1KΩ Nominal.
"Sinking" or "Sourcing" Mode, switch selectable in pairs.
LED indicators, LED Load Current 5mA nominal @ 24Volts DC.
Logic Power Requirements:
3.3V@10mA Max from the Controller.

Outputs:
Solid-State, Sourcing.
10-28 Volts DC @ 3A Max.
Short circuit protection. Fault Detection.
LED indicators, LED Load Current 5mA nominal @ 24 Volts DC.
Logic Power Requirements:
3.3V@10mA Max from the Controller.

IMPORTANT NOTE: Please read carefully and thoroughly all of the **CAUTIONS** on the inside back cover.

Input/Output Module Pinouts

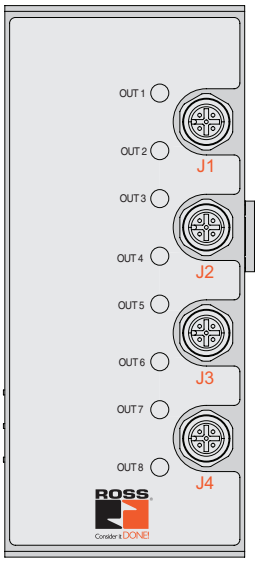
Model Number RRSST8XM12A – Expansion Module, 8 Digital Outputs

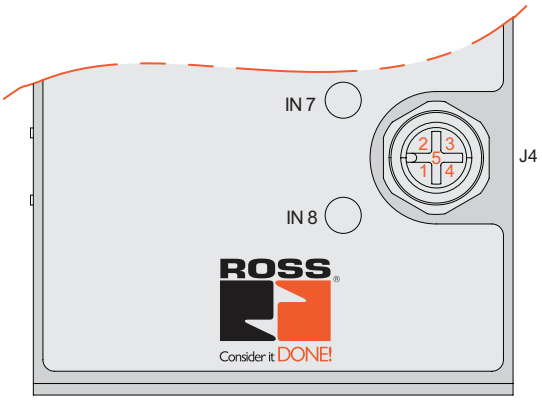
J1 PINOUT
PIN 1 - +24 Volts
PIN 2 - Input #2
PIN 3 - Common
PIN 4 - Input #1
PIN 5 - (NO Connection)

J2 PINOUT
PIN 1 - +24 Volts
PIN 2 - Input #4
PIN 3 - Common
PIN 4 - Input #3
PIN 5 - (NO Connection)

J3 PINOUT
PIN 1 - +24 Volts
PIN 2 - Input #6
PIN 3 - Common
PIN 4 - Input #5
PIN 5 - (NO Connection)

J4 PINOUT
PIN 1 - +24 Volts
PIN 2 - Input #8
PIN 3 - Common
PIN 4 - Input #7
PIN 5 - (NO Connection)





12C Address Selection

SW #	Hexidecimal Address							
	A0	A2	A4	A6	A8	AA	AC	AE
SW1	A	B	A	B	A	B	A	B
SW2	A	A	B	B	A	A	B	B
SW3	A	A	A	A	B	B	B	B

Model Number RRSSN16M12A – Expansion Module, 16 Digital Inputs

J1 PINOUT
PIN 1 - +24 Volts
PIN 2 - Input #2
PIN 3 - Common
PIN 4 - Input #1
PIN 5 - (NO Connection)

J2 PINOUT
PIN 1 - +24 Volts
PIN 2 - Input #4
PIN 3 - Common
PIN 4 - Input #3
PIN 5 - (NO Connection)

J3 PINOUT
PIN 1 - +24 Volts
PIN 2 - Input #6
PIN 3 - Common
PIN 4 - Input #5
PIN 5 - (NO Connection)

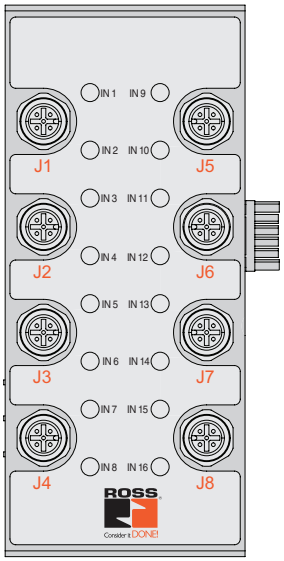
J4 PINOUT
PIN 1 - +24 Volts
PIN 2 - Input #8
PIN 3 - Common
PIN 4 - Input #7
PIN 5 - (NO Connection)

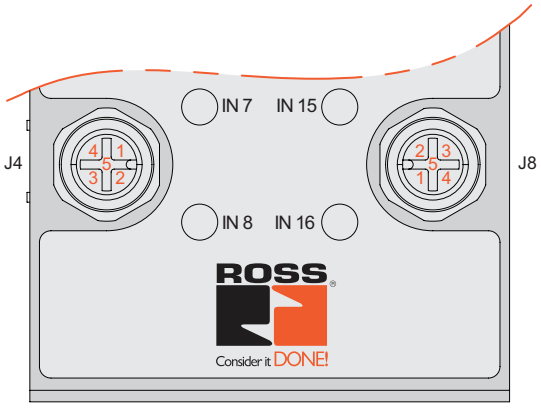
J5 PINOUT
PIN 1 - +24 Volts
PIN 2 - Output #10
PIN 3 - Common
PIN 4 - Output #9
PIN 5 - (NO Connection)

J6 PINOUT
PIN 1 - +24 Volts
PIN 2 - Output #12
PIN 3 - Common
PIN 4 - Output #11
PIN 5 - (NO Connection)

J7 PINOUT
PIN 1 - +24 Volts
PIN 2 - Output #14
PIN 3 - Common
PIN 4 - Output #13
PIN 5 - (NO Connection)

J8 PINOUT
PIN 1 - +24 Volts
PIN 2 - Output #16
PIN 3 - Common
PIN 4 - Output #15
PIN 5 - (NO Connection)





12C Address Selection

SW #	Hexidecimal Address							
	50	52	54	56	58	5A	5C	5E
SW1	A	B	A	B	A	B	A	B
SW2	A	A	B	B	A	A	B	B
SW3	A	A	A	A	B	B	B	B

Input Mode Selection

SW#	Input#	Sinking	Sourcing
SW1A	Input 1/2	A	B
SW2A	Input 3/4	A	B
SW3A	Input 5/6	A	B
SW4A	Input 7/8	A	B
SW5A	Input 9/10	A	B
SW6A	Input 11/12	A	B
SW7A	Input 13/14	A	B
SW8A	Input 15/16	A	B

ELECTRICAL SPECIFICATIONS: For product on this page.
Inputs:
Input Voltage Range: 10-28 Volts DC.
Input Current: 9mA Nominal @ 24 Volts DC.
Input Resistance: 5.1KΩ Nominal.
"Sinking" or "Sourcing" Mode, switch selectable in pairs.
LED indicators, LED Load Current 5mA nominal @ 24Volts DC.
Logic Power Requirements:
3.3V@10mA Max from the Controller.

Outputs:
Solid-State, Sourcing.
10-28 Volts DC@3A Max.
Short circuit protection. Fault Detection.
LED indicators, LED Load Current 5mA nominal @ 24 Volts DC.
Logic Power Requirements:
3.3V@10mA Max from the Controller.

IMPORTANT NOTE: Please read carefully and thoroughly all of the **CAUTIONS** on the inside back cover.

Input/Output Module Pinouts

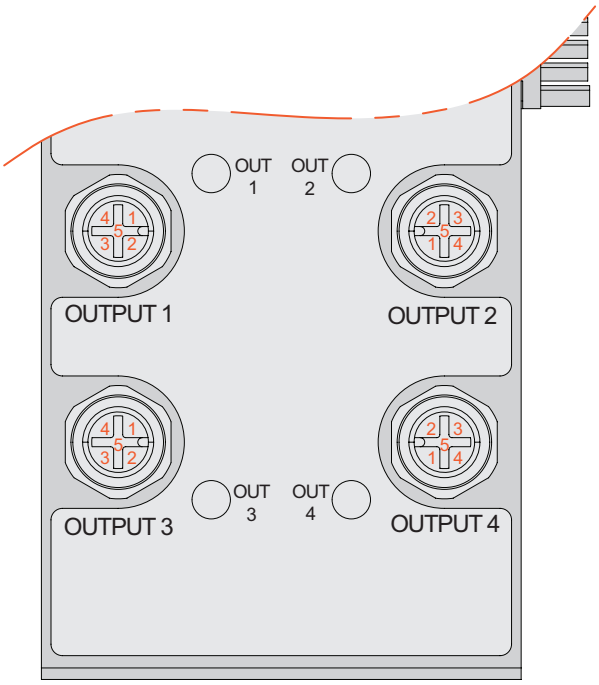
Model Number RRSSTR4M12A – Expansion Module, 4 Relay Outputs

OUTPUT 1 PINOUT
PIN 1 - +24 Volts
PIN 2 - Contact Common
PIN 3 - 24 Volts Common
PIN 4 - N.O. Contact
PIN 5 - N.C. Contact

OUTPUT 2 PINOUT
PIN 1 - +24 Volts
PIN 2 - Contact Common
PIN 3 - 24 Volts Common
PIN 4 - N.O. Contact
PIN 5 - N.C. Contact

OUTPUT 3 PINOUT
PIN 1 - +24 Volts
PIN 2 - Contact Common
PIN 3 - 24 Volts Common
PIN 4 - N.O. Contact
PIN 5 - N.C. Contact

OUTPUT 4 PINOUT
PIN 1 - +24 Volts
PIN 2 - Contact Common
PIN 3 - 24 Volts Common
PIN 4 - N.O. Contact
PIN 5 - N.C. Contact



12C Address Selection

SW #	Hexidecimal Address							
	E0	E2	E4	E6	E8	EA	EC	EE
SW1	A	B	A	B	A	B	A	B
SW2	A	A	B	B	A	A	B	B
SW3	A	A	A	A	B	B	B	B

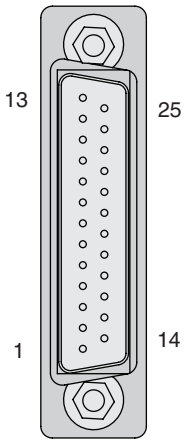
ELECTRICAL SPECIFICATIONS:
Relay Outputs:
Form C (SPDT)
115Volts AC @3A Max.
24 Volts DC @4A
24 Volts Power Requirements: 33mA per activated relay.
Logic Power Requirements:
3.3 Volts @15mA Max from the Controller.

Model Number RRSST24UBA – Expansion Module, 24 Digital OUT

12C Address Selection

SW #	Hexidecimal Address							
	C0	C2	C4	C6	C8	CA	CC	CE
SW1	A	B	A	B	A	B	A	B
SW2	A	A	B	B	A	A	B	B
SW3	A	A	A	A	B	B	B	B

ELECTRICAL SPECIFICATIONS:
Outputs:
Solid-State, Sourcing.
10-28 Volts DC @ 0.5A Max.
Short circuit protection.
Fault Detection.
Logic Power Requirements:
3.3 Volts @12mA Max from the Controller.

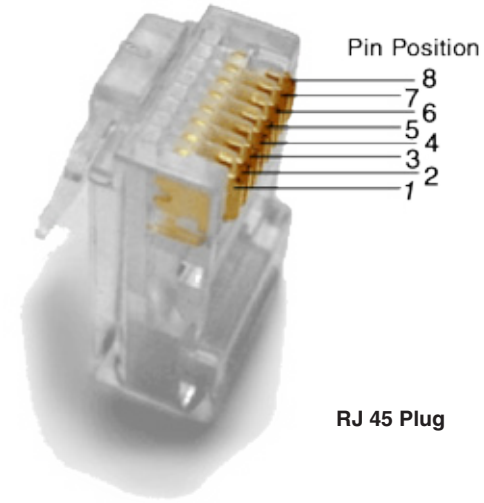


OUTPUTS

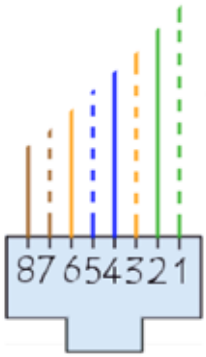
PINOUT
PIN 1 - Output Solenoid #1
PIN 2 - Output Solenoid #3
PIN 3 - Output Solenoid #5
PIN 4 - Output Solenoid #7
PIN 5 - Output Solenoid #9
PIN 6 - Output Solenoid #11
PIN 7 - Output Solenoid #13
PIN 8 - Output Solenoid #15
PIN 9 - Output Solenoid #17
PIN 10 - Output Solenoid #19
PIN 11 - Output Solenoid #21
PIN 12 - Output Solenoid #23
PIN 13 - Common
PIN 14 - Output Solenoid #2
PIN 15 - Output Solenoid #4
PIN 16 - Output Solenoid #6
PIN 17 - Output Solenoid #8
PIN 18 - Output Solenoid #10
PIN 19 - Output Solenoid #12
PIN 20 - Output Solenoid #14
PIN 21 - Output Solenoid #16
PIN 22 - Output Solenoid #18
PIN 23 - Output Solenoid #20
PIN 24 - Output Solenoid #22
PIN 25 - Output Solenoid #24

IMPORTANT NOTE: Please read carefully and thoroughly all of the **CAUTIONS** on the inside back cover.

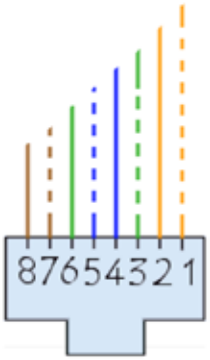
Computer to D-Series Network Connection



RJ 45 Plug



RJ 45 Type "A"
Straight Cable Connection



RJ 45 Type "B"
Crossover Cable Connection

Type "A" Ethernet Cable Wiring (Straight for connection to a network switch):

RJ45 Pin #	Wire Color (T568A)	Wire Diagram (T568A)	10Base-T Signal 100Base-TX Signal	Signal	M12 4 Pin D-Code Pin #
1	White/Green		Transmit+	BI_DA+	1
2	Green		Transmit-	BI_DA-	3
3	White/Orange		Receive+	BI_DB+	2
4	Blue		Unused	BI_DC+	
5	White/Blue		Unused	BI_DC-	
6	Orange		Receive-	BI_DB-	4
7	White/Brown		Unused	BI_DD+	
8	Brown		Unused	BI_DD-	

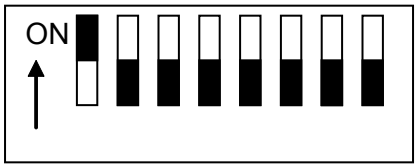
Type "B" Ethernet Cable Wiring (Straight for connection to a network switch):

RJ45 Pin #	Wire Color (T568B)	Wire Diagram (T568B)	10Base-T Signal 100Base-TX Signal	Signal	M12 4 Pin D-Code Pin #
1	White/Orange		Transmit+	BI_DA+	1
2	Orange		Transmit-	BI_DA-	3
3	White/Green		Receive+	BI_DB+	2
4	Blue		Unused	BI_DC+	
5	White/Blue		Unused	BI_DC-	
6	Green		Receive-	BI_DB-	4
7	White/Brown		Unused	BI_DD+	
8	Brown		Unused	BI_DD-	

DeviceNet™ Switches

The MacID (or Address on the *DeviceNet*™ network) and the network baud rate can be set by using eight DIP switches, see Figure 1-1.

Figure 1-1



DeviceNet switches DIP

The first six switches (1-6) to the MAC ID or *DeviceNet*™ address are described in Table 1-1.

Table 1-1 Switches (1-6) for MAC ID or *DeviceNet*™ address

Address	SW1	SW2	SW3	SW4	SW5	SW6
Decimal	2^0	2^1	2^2	2^3	2^4	2^5
01	ON	OFF	OFF	OFF	OFF	OFF
15	ON	ON	ON	ON	OFF	OFF
40	OFF	OFF	OFF	ON	OFF	ON
63 (default)	ON	ON	ON	ON	ON	ON

The last two DIP switches (7-8) control the *DeviceNet*™ network baud rate. See Table 1-2.

Table 1-2 Switches 7 and 8 for baud rate

Baud Rate/ SW Mode	SW1 2^0	SW2 2^1
125K	OFF	OFF
250K	ON	OFF
500K	OFF	ON
Restored default settings	ON	ON

Note: *The factory default switch settings are Address 63 and 125K.*

DeviceNet™ Object Model

Table 2-1 describes data types used in this Object Model.

Table 2-1 Data Types

Data Type	Description
USINT	Unsigned Short Integer (8-bit)
UINT	Unsigned Integer (16-bit)
UDINT	Unsigned Double Integer (32-bit)
INT	Signed Integer (16-bit)
STRING	Character String (1 byte per character)
SHORT STRING*nn*	Character String (1st byte is length; up to *nn* characters)
BYTE	Bit String (8-bits)
WORD	Bit String (16-bits)
DWORD	Bit String (32-bits)
REAL	IEEE 32-bit Single Precision Floating Point

Identity Object (01_{HEX} - 1 Instance)

The following tables contain the attribute, status, and common services information for the Identity Object.

Table 2-2 Identity Object (01_{HEX} - 1 Instance)

Instance	Attribute ID	Name	*DeviceNet*™ Data Type	Data Value	Access Rule
Class (Instance 0)	1	Revision	UINT	1	Get
Instance 1	1	Vendor Number	UINT	31	Get
	2	Device Type	UINT	0	Get
	3	Product Code Number	UINT	33	Get
	4	Product major revision	USINT	2	Get
		Product minor revision	USINT	6	Get
	5	Status	WORD	Varies	Get
	6	Serial Number	UDINT	Unique 32 bit value	Get
	7	Product Name	SHORT STRING 32	Fill in	GET

Table 2-3 Identity Object's common services

Service Code	Implemented for Class Level	Implemented for Instance Level	Service Name
05_{Hex}	No	Yes	Reset
$0E_{Hex}$	Yes	Yes	Get_Attribute_Single
10_{Hex}	No	Yes	Get_Attribute_Single

Message Router Object (02_{HEX} - 1 Instance)

(No required attributes.)

DeviceNet™ Object (03_{HEX} - 1 Instance)

The following tables contain the attribute and common services information for the *DeviceNet*™ Object.

Table 2-4 *DeviceNet*™ Object (01_{HEX} - 1 Instance)

Instance	Attribute ID	Name	*DeviceNet*™ Data Type	Data Value	Access Rule
Class (Instance 0)	1	Revision	UINT	2	Get
Instance 1	1	MAC ID	USINT	63	Get
	2	Baud Rate	USINT	0	Get
	5	Structure of			Get
		Allocation Choice Byte	Byte		0xFF
		Master's MAC ID	USINT	0	Get
	6	MAC ID Switch changed	BOOL	0	Get
	7	Baud Rate Switch changed	BOOL	0	Get
	8	MAC ID Switch value	USINT	0	Get
	9	Baud Rate Switch value	USINT	0	Get

Table 2-5 *DeviceNet*™ Object's common services

Service Code	Implemented for Class Level	Implemented for Instance Level	Service Name
$0E_{Hex}$	Yes	Yes	Get_Attribute_Single
10_{Hex}	No	Yes	Get_Attribute_Single

Assembly Object (04_{HEX} - 2 Instances)

The following tables contain the attribute, instance, data mapping, and common services information for the Assembly Object.

Table 2-6 Assembly Object (04_{HEX} - 2 Instances)

Instance	Attribute ID	Name	*DeviceNet*™ Data Type	Data Value	Access Rule
Class (Instance 0)	1	Revision	UINT	2	Get
Instance 1	2	Max instance	UINT	0x81	Get
	100	Input index	USINT	0x64	Get/Set
	101	Input size (in bytes)	UINT	0x00	Get
	102	Output index	USINT	0x70	Get/Set
	103	Output size (in bytes)	UINT	0x00	Get
Input	3	Input			Get
		Byte	Data Field		
Instance 0X64		0-3	T->O dynamic assembly point instance 1		
		4-7	T->O dynamic assembly point instance 2		
		...			
		248-251	T->O dynamic assembly point instance 63		
		251-255	T->O dynamic assembly point instance 64		
Output	3	Output			Get/Set
Instance 0X70		0-3	O->T dynamic assembly point instance 1		
		4-7	O->T dynamic assembly point instance 2		
		...			
		248-251	O->T dynamic assembly point instance 63		
		251-255	O->T dynamic assembly point instance 64		

*These valves are stored to NVRAM.

Table 2-7 Assembly Output instance data mapping

Data Component Name	Class Name	Class Number	Instance Number	Attribute Number

Table 2-8 Assembly Input instance data mapping

Data Component Name	Class Name	Class Number	Instance Number	Attribute Number

Table 2-9 Assembly Object's common services

Service Code	Implemented for Class Level	Implemented for Instance Level	Service Name
$0E_{Hex}$	Yes	Yes	Get_Attribute_Single
10_{Hex}	No	Yes	Get_Attribute_Single

Connection Object (05HEX - 3 Instances)

The following tables contain the attribute, and common services information for the Connection Object.

Table 2-10 Connection Object (01_{HEX} - 1 Instance)

Instance ID	Attribute	Name	*DeviceNet*™ Data Type	Data Value	Access Rule
Class (Instance 0)	1	Revision	UINT	1	Get
Instance 1 Explicit Connection	1	State	USINT	0=Nonexistent 3=Established 5=Deferred Delete	Get
	2	Instance type	USINT	0	Get
	3	Transport trigger	USINT	83_{HEX}	Get
	4	Produced connection ID	UINT	$10xxxxxx11_{BIN}$ xxxxxx=Node Address	Get
	5	Consumed connection ID	UINT	$10xxxxxx100_{BIN}$ xxxxxx=Node Address	Get
	6	Initial communication character	USINT	83_{HEX}	Get
	7	Produced connection size	UINT	Fill in	Get
	8	Consumed connection size	UINT	Fill in	Get
	9	Expected packet rate	UINT	2500 msec	Get
	12	Watchdog timeout action	USINT	4=deferred delete	Get
	13	Produced connection path length	UINT	0	Get
	14	Produced connection path	USINT Array	Null	Get/Set*
	15	Consumed connection path length	UINT	0	Get
	16	Consumed connection path	USINT Array	Null	Get/Set*
Instance 2 Polled I/O	1	State	USINT	0=Nonexistent 1=Configuring 3=Established 4=Time out	Get
	2	Instance type	USINT	1	Get
	3	Transport trigger	USINT	82_{HEX}	Get
	4	Produced connection ID	UINT	$01111xxxxxx11_{BIN}$ xxxxxx=Node Address	Get
	5	Consumed connection ID	UINT	$10xxxxxx100_{BIN}$ xxxxxx=Node Address	Get
	6	Initial communication character	USINT	01_{HEX}	Get
	7	Produced connection size	UINT	Fill in	Get
	8	Consumed connection size	UINT	Fill in	Get
	9	Expected packet rate	UINT	0	Get/Set
	12	Watchdog timeout action	USINT	0=Timeout	Get/Set
	13	Produced connection path length	UINT	Fill in	Get/Set*
	14	Produced connection path	USINT Array	Fill in	Get
	15	Consumed connection path length	UINT	Fill in	Get
	16	Consumed connection path	USINT Array	Fill in	Get/Set*

*These values are stores to NVRAM.

Connection Object (05_{HEX} - 3 Instances)

The following tables contain the attribute, and common services information for the Connection Object.

Table 2-10 Connection Object (01_{HEX} - 1 Instance)

Instance ID	Attribute	Name	DeviceNet™ Data Type	Data Value	Access Rule
Class (Instance 0)	1	Revision	UINT	1	Get
Instance 4 Change of State/Cyclic Acknowledged	1	State	USINT	0=Nonexistent 1=Configuring 3=Established 4=Time Out	Get
	2	Instance Type	USINT	1	Get
	3	Transport Trigger	USINT	02_{HEX}=Cyclic 12_{HEX}=Change of State	Get
	4	Produced connection ID	UINT	$01101xxxxxx_{BIN}$ xxxxxx=Node Address	Get
	5	Consumed connection ID	UINT	$10xxxxxx010_{BIN}$ xxxxxx=Node Address	Get
	6	Initial communication character	USINT	01_{HEX}	Get
	7	Produced connection size	UINT	Fill in	Get
	8	Consumed connection size	UINT	0	Get
	9	Expected packet rate	UINT	0	Get/Set
	12	Watchdog timeout action	USINT	0=Timeout	Get
	13	Produced connection path length	UINT	6	Get
	14	Produced connection path	USINT Array	Fill in	Get
	15	Consumed connection path length	UINT	4	Get
	16	Consumed connection path	USINT Array	0x20 0x2B 0x24 0x01	Get
Instance 4 Change of State/Cyclic Unacknowledged	1	State	USINT	0=Nonexistent 1=Configuring 3=Established 4=Time Out	Get
	2	Instance Type	USINT	1	Get
	3	Transport Trigger	USINT	02_{HEX}=Cyclic 12_{HEX}=Change of State	Get
	4	Produced connection ID	UINT	$01101xxxxxx_{BIN}$ xxxxxx=Node Address	Get
	5	Consumed connection ID	UINT	$FFFF_{HEX}$	Get
	6	Initial communication character	USINT	$0F_{HEX}$	Get
	7	Produced connection size	UINT	Fill in	Get
	8	Consumed connection size	UINT	Fill in	Get
	9	Expected packet rate	UINT	0	Get/Set
	12	Watchdog timeout action	USINT	0=Timeout	Get/Set
	13	Produced connection path length	UINT	Fill in	Get
	14	Produced connection path	USINT Array	Fill in	Get
	15	Consumed connection path length	UINT	Fill in	Get
	16	Consumed connection path	USINT Array	Fill in	Get

*These values are stores to NVRAM.

Table 2-11 Connection Object's common services

Service Code	Implemented for Class Level	Implemented for Instance Level	Service Name
$0E_{Hex}$	Yes	Yes	Get_Attribute_Single
10_{Hex}	No	Yes	Get_Attribute_Single

Acknowledge Handler Object ($2B_{HEX}$ - 1 Instance)

The following tables contain the attribute and common services information for the Acknowledge Handler Object.

Table 2-12 Acknowledge Handler Object (01_{HEX} - 1 Instance)

Instance	Attribute ID	Name	*DeviceNet*™ Data Type	Data Value	Access Rule
Class (Instance 0)	1	Revision	UINT	1	Get
Instance 1	1	Acknowledge timer	UINT	16	Get
	2	Retry limit	USINT	1	Get
	3	COS producing connection instance	UINT	4	Get

Table 2-13 Acknowledge Handler Object's common services

Service Code	Implemented for Class Level	Implemented for Instance Level	Service Name
$0E_{Hex}$	Yes	Yes	Get_Attribute_Single
10_{Hex}	No	Yes	Get_Attribute_Single

Dynamic Input Assembly Point Object (64_{HEX} - 1 Instance)

The following tables contain the attribute and common services information for the Dynamic Input Assembly Point Object.

Table 2-14 Dynamic Input Assembly Point Object (64_{HEX} - 1 Instance)

Instance	Attribute ID	Name	*DeviceNet*™ Data Type	Data Value	Access Rule
Class (Instance 0)	1	Revision	UINT	1	Get
	100	Number of Instances	UINT	64	Get
	101	Assembly Instance 0x64 Size (In Bytes)	UINT	0	Get
Instance 1-64	1	Dynamic Point Configuration Structure:			Get
		Class ID	USINT	0x00	
		Instance ID	USINT	0x00	
		Attribute ID	USINT	0x00	

Table 2-15 Dynamic Input Assembly Point Object's common services

Service Code	Implemented for Class Level	Implemented for Instance Level	Service Name
$0E_{Hex}$	Yes	Yes	Get_Attribute_Single
10_{Hex}	Yes	Yes	Get_Attribute_Single

Dynamic Output Assembly Point Object (64_{HEX} - 1 Instance)

The following tables contain the attribute and common services information for the Dynamic Output Assembly Point Object.

Table 2-16 Dynamic Output Assembly Point Object (64_{HEX} - 1 Instance)

Instance	Attribute ID	Name	*DeviceNet*™ Type	Data Value	Access Rule
Class (Instance 0)	1	Revision	UINT	1	Get
	100	Number of Instances	UINT	64	Get
	101	Assembly Instance 0x70 Size (In Bytes)	UINT	0	Get
Instance 1-64	1	Dynamic Point Configuration Structure:			Get
		Class ID	USINT	0x00	
		Instance ID	USINT	0x00	
		Attribute ID	USINT	0x00	

Table 2-17 Dynamic Output Assembly Point Object's common services

Service Code	Implemented for Class Level	Implemented for Instance Level	Service Name
$0E_{Hex}$	Yes	Yes	Get_Attribute_Single
10_{Hex}	Yes	Yes	Get_Attribute_Single

24 SV Output Object (66_{HEX} - 1 Instance)

The following tables contain the attribute and common services information for RRSSCDM12A *DeviceNet*™ Module.

Table 2-18 24 SV Output Object (66_{HEX} - 1 Instance)

Instance	Attribute ID	Name	*DeviceNet*™ Data Type	Data Value	Access Rule
Class (Instance 0)	1	Revision	UINT	1	Get
Instance 1	3	Output Status Data	DWORD	0x00	Get
	4	Output Data	DWORD	0x00	Get/Set

Table 2-19 RRSSN88M12A/RRSSP88M12A Digital Input/Output Object's common services

Service Code	Implemented for Class Level	Implemented for Instance Level	Service Name
$0E_{Hex}$	Yes	Yes	Get_Attribute_Single
10_{Hex}	No	Yes	Get_Attribute_Single

8 Digital Input Object (67_{HEX} - 8 Instances)

The following tables contain the attribute and common services information for the RRSSN8XM12A Digital Input.

Table 2-20 8 Digital Input Object (67_{HEX} - 8 Instances)

Instance	Attribute ID	Name	*DeviceNet*™ Data Type	Data Value	Access Rule
Class (Instance 0)	1	Revision	UINT	1	Get
	100	Modules Present	USINT	0X00	Get
Instance 1-8	3	Input Data	DWORD	0X00	Get

Table 2-21 RRSSN8XM12A Digital Input Object's common services

Service Code	Implemented for Class Level	Implemented for Instance Level	Service Name
$0E_{Hex}$	Yes	Yes	Get_Attribute_Single
10_{Hex}	No	Yes	Get_Attribute_Single

16 Digital Input Object (68_{HEX} - 8 Instances)

The following tables contain the attribute and common services information for the RRSSN16M12A Digital Input.

Table 2-22 16 Digital Input Object (68_{HEX} - 8 Instances)

Instance	Attribute ID	Name	*DeviceNet*™ Data Type	Data Value	Access Rule
Class (Instance 0)	1	Revision	UINT	1	Get
	100	Modules Present	USINT	0X00	Get
Instance 1-8	3	Input Data	DWORD	0X00	Get

Table 2-23 RRSSN16M12A Digital Input Object's common services

Service Code	Implemented for Class Level	Implemented for Instance Level	Service Name
$0E_{Hex}$	Yes	Yes	Get_Attribute_Single
10_{Hex}	No	Yes	Get_Attribute_Single

8 Digital Output Object (69_{HEX} - 8 Instances)

The following tables contain the attribute and common services information for the RRSST8XM12A Digital Output.

Table 2-24 8 Digital Output Object (67_{HEX} - 8 Instances)

Instance	Attribute ID	Name	*DeviceNet*™ Data Type	Data Value	Access Rule
Class (Instance 0)	1	Revision	UINT	1	Get
	100	Modules Present	USINT	0X00	Get
Instance 1-8	3	Output Status Data	DWORD	0X00	Get
	4	Output Data	DWORD	0X00	Get

Table 2-25 8 Digital Output Object's common services

Service Code	Implemented for Class Level	Implemented for Instance Level	Service Name
$0E_{Hex}$	Yes	Yes	Get_Attribute_Single
10_{Hex}	No	Yes	Get_Attribute_Single

8 Digital Input/8 Output Object ($6A_{HEX}$ - 8 Instances)

The following tables contain the attribute and common services information for the RRSSN88M12A/RRSSP88M12A Digital Input/Output.

Table 2-26 8 Digital Input/8 Output Object ($6A_{HEX}$ - 8 Instances)

Instance	Attribute ID	Name	*DeviceNet*™ Data Type	Data Value	Access Rule
Class (Instance 0)	1	Revision	UINT	1	Get
	100	Modules Present	USINT	0X00	Get
Instance 1-8	3	Input Data/Output Status Data	DWORD	0X00	Get
	4	Output Data	DWORD	0X00	Get/Set

Table 2-27 8 Digital Input/Output Object's common services

Service Code	Implemented for Class Level	Implemented for Instance Level	Service Name
$0E_{Hex}$	Yes	Yes	Get_Attribute_Single
10_{Hex}	No	Yes	Get_Attribute_Single

4 Relay Output Object ($6B_{HEX}$ - 8 Instances)

The following tables contain the attribute and common services information for the RRSSTR4M12A Relay Output.

Table 2-28 4 Relay Output Object ($6B_{HEX}$ - 8 Instances)

Instance	Attribute ID	Name	*DeviceNet*™ Data Type	Data Value	Access Rule
Class (Instance 0)	1	Revision	UINT	1	Get
	100	Modules Present	USINT	0X00	Get
Instance 1-8	4	Relay Output Data	DWORD	0X00	Get/Set

Table 2-29 4 Relay Output Object's common services

Service Code	Implemented for Class Level	Implemented for Instance Level	Service Name
$0E_{Hex}$	Yes	Yes	Get_Attribute_Single
10_{Hex}	No	Yes	Get_Attribute_Single

24 Digital Output Object ($6C_{HEX}$ - 8 Instances)

The following tables contain the attribute and common services information for the RRSST24SUBA Digital Output.

Table 2-30 24 Digital Output Object ($6C_{HEX}$ - 8 Instances)

Instance	Attribute ID	Name	*DeviceNet*™ Data Type	Data Value	Access Rule
Class (Instance 0)	1	Revision	UINT	1	Get
	100	Modules Present	USINT	0X00	Get
Instance 1-8	3	Output Status Data	DWORD	0X00	Get
	4	Output Data	DWORD	0X00	Get/Set

Table 2-31 24 Digital Output Object's common services

Service Code	Implemented for Class Level	Implemented for Instance Level	Service Name
$0E_{Hex}$	Yes	Yes	Get_Attribute_Single
10_{Hex}	No	Yes	Get_Attribute_Single

2 Analog Input Object ($6D_{HEX}$ - 8 Instances)

The following tables contain the attribute and common services information for the RRSSNAVM12A/RRSSNACM12A Analog Input.

Table 2-32 2 Analog Input Object ($6D_{HEX}$ - 8 Instances)

Instance	Attribute ID	Name	*DeviceNet*™ Data Type	Data Value	Access Rule
Class (Instance 0)	1	Revision	UINT	1	Get
	100	Modules Present	USINT	0X00	Get
Instance 1-8	3	Analog Input Data	DWORD	0X00	Get

Table 2-33 2 Analog Input Object's common services

Service Code	Implemented for Class Level	Implemented for Instance Level	Service Name
$0E_{Hex}$	Yes	Yes	Get_Attribute_Single
10_{Hex}	No	Yes	Get_Attribute_Single

2 Analog Output Object ($6D_{HEX}$ - 8 Instances)

The following tables contain the attribute and common services information for the RRSSTAVM12A/RRSSTACM12A Analog Output.

Table 2-34 2 Analog Output Object ($6D_{HEX}$ - 8 Instances)

Instance	Attribute ID	Name	*DeviceNet*™ Data Type	Data Value	Access Rule
Class (Instance 0)	1	Revision	UINT	1	Get
	100	Modules Present	USINT	0X00	Get
Instance 1-8	4	Analog Output Data	DWORD	0X00	Get/Set

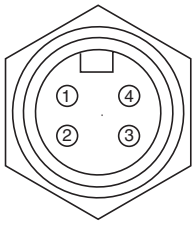
Table 2-35 2 Analog Output Object's common services

Service Code	Implemented for Class Level	Implemented for Instance Level	Service Name
$0E_{Hex}$	Yes	Yes	Get_Attribute_Single
10_{Hex}	No	Yes	Get_Attribute_Single

Flexsam Devicenet Communication Module to D-Series *DeviceNet*™ Communication Module Replacement Procedure

1. Turn off all power sources.
2. Remove the Bus and Power connections.
3. Remove Flexsam Module from the end station plate via 4 tie rod bolts opposite the valve stack. If I/O modules are attached, they will have to be replaced with D-Series modules as well.
4. Remove the ribbon cable that connects the module to the first valve manifold.
5. Attach ribbon cable to D-Series module and to the first valve manifold. Use cable number RPS5624P for ISO sizes 0 & 00 and RPS4024P for ISO sizes 1, 2, & 3.
6. Attach D-Series module to end station plate via 4 tie rod bolts.
7. Attach Power Cord.
   (NOTE: Pinouts have changed. See new pin schematic.)

Flexsam

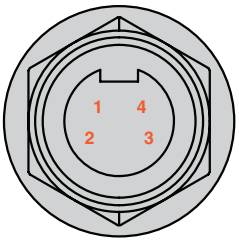


Face View, Male
Mini Connector

DC Power

Pin	Function
1	Com
2	24 Volts DC
3	24 Volts DCE Outputs
4	Earth Ground

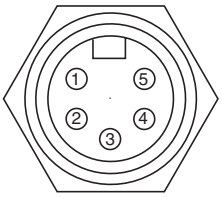
D-Series



POWER CONNECTOR PINOUT
PIN 1 - Black wire - +24 Volts I/O IN
PIN 2 - Blue wire - PE Ground
PIN 3 - Brown wire - Common
PIN 4 - White wire - +24 Volts Logic IN

8. Attach communication cord to *DeviceNet*™ connector.
   (NOTE: Pinouts remain the same but connector size has changed. See new pin schematic.)

Flexsam

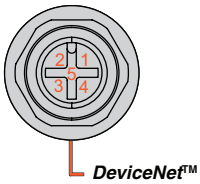


Face View, Male
Mini Connector

Bus

Pin	Function
1	Shield
2	Volts DC+
3	Common
4	CAN_H
5	CAN_L

D-Series



⚠ ***DeviceNet*™ PINOUT**
PIN 1 - Shield
PIN 2 - +Volts Sense
PIN 3 - Common
PIN 4 - CAN H
PIN 5 - CAN L

9. Follow start up procedures described in this Manual.

Firmware Update Procedure

Updating Controller Firmware

To update the controller firmware:

1. On the Config Tool Menu, Click File.
2. Click Update Firmware Reference image on the right (see figure 20).

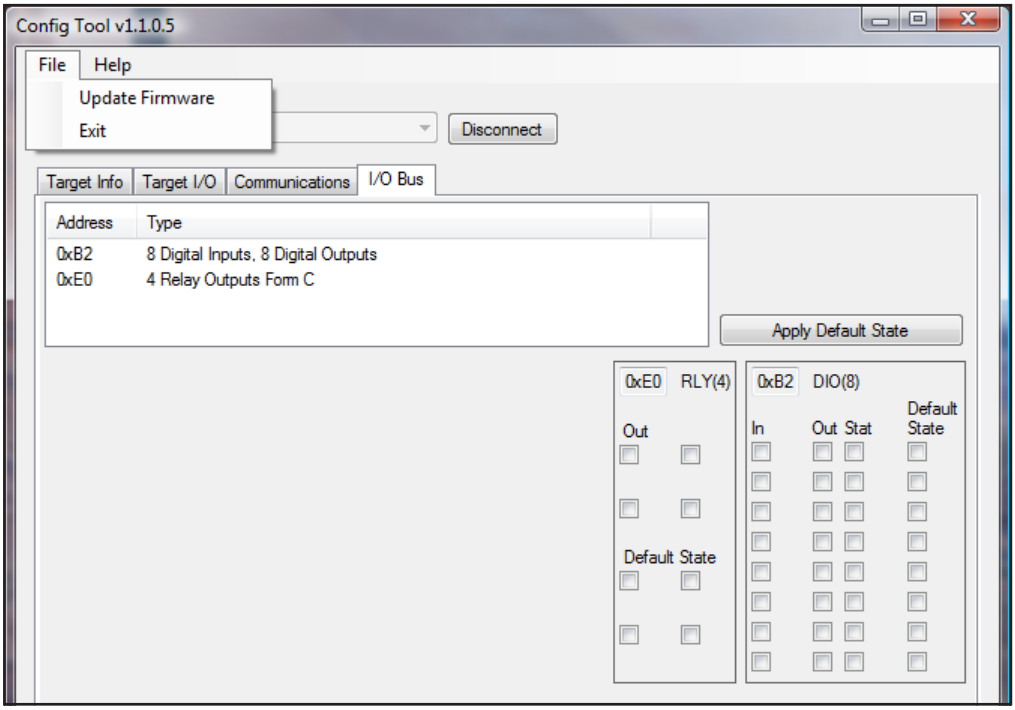


Figure 20

The BootloaderForm Window will open.

Please note that opening this window will cause the controller to halt program execution to allow firmware updates.

The controller must be restarted for normal operation to resume. Reference image below (see figure 21).

1. Target – Displays the currently selected controller target name.
2. Bootloader Version – This displays the currently installed version of the bootloader in the controller. The bootloader acts as a bios and allows the Firmware and other features to be loaded and configured.
3. Firmware Version – This displays the currently installed version of the Firmware in the controller. The firmware is similar to an operating system. It provides the functionality that operates in conjunction with the bootloader.
4. Serial Number – This is the factory programmed serial number of the Valve Controller.
5. Filename – This text box is used in conjunction with the Browse button to browse to a new Firmware (Kernel) file (.dat) and select it prior to installing it.
6. Browse Button – Clicking this button will open a Browse window. Use this window to select the new Firmware (kernel) file to install. All Firmware (kernel) files have .dat extensions.
7. Target – Once a new Firmware (kernel) has been selected, its target name will be displayed here. This is used to verify the correct target file kernel has been selected.
8. Kernel Version – Once a new Firmware (kernel) has been selected, its version will be displayed here.
9. Update Target – Click the Update Target button to install the selected Firmware (kernel) into the controller. This will take several minutes. A status bar will display the progress. Do not interrupt or cycle power during this process. Once the installation is complete, the controller will restart.
10. Restart Target – This button is used for the controller, to restart the same as cycling power. If the BootloaderForm window is entered accidentally, click this button to restart the controller and regain normal operation.

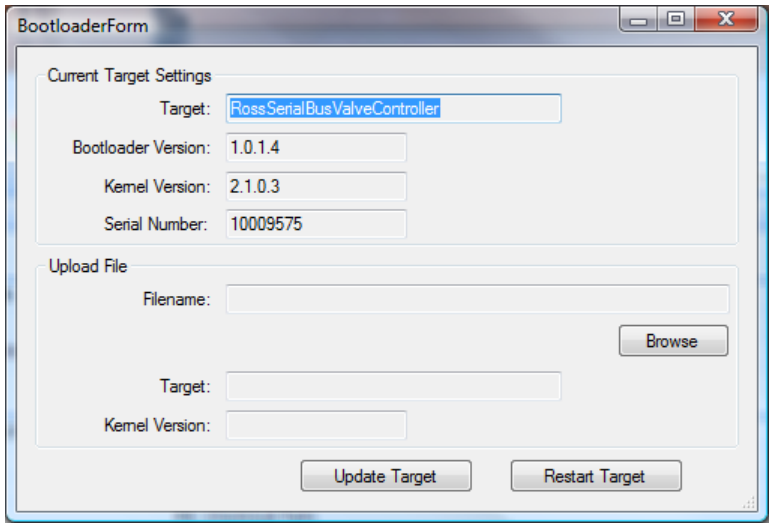


Figure 21

Communication Module LED Status Chart

LED	LED STATUS	
Watchdog (Red)	– When the system is properly executing the kernel (running normally), the LED will blink at 1Hz – When the system is in the bootloader, the LED will blink rapidly when frequency is between 5 and 10Hz	
Communications (Amber)	– Blinks on communications from CAN, Modbus, or configuration tool – This will be on for 100ms, then off for 100ms	
I/O Status Power	– Blinks at 1Hz – Will be green if active onboard outputs are OK/Normal – Will be red if an active output has an error	
DeviceNet™ Status	Based on *DeviceNet*™ specifications	
Can Status	Flashing Green	On-line Not Connected
	Green	Link OK On-line, Connected
	Flashing Red	Connection Time-Out Mac or Baud Switch has changed
	Red	Critical Link Failure

Also, I/O Status will blink fast red if the SD Card settings are corrupt.

Notes

Notes

Notes

CAUTIONS

WARNING

BEFORE SERVICING THIS UNIT!

Hazardous voltages and fluid pressures may be present. Disconnect all external power, BUS connections, and air supply prior to the servicing of this device.

WARNING

To avoid unpredictable system behavior that can cause personal injury and property damage:

- Disconnect electrical supply (when necessary) before installation, servicing, or conversion.
- Disconnect air supply and depressurize all air lines connected to this product before installation, servicing, or conversion.
- Operate within the manufacturer's specified pressure, temperature, and other conditions listed in these instructions.
- Medium must be moisture-free if ambient temperature is below freezing.
- Service according to procedures listed in these instructions.
- Installation, service, and conversion of these products must be performed by knowledgeable personnel who understand how pneumatic products are to be applied.
- After installation, servicing, or conversion, air and electrical supplies (when necessary) should be connected and the product tested for proper function and leakage. If audible leakage is present, or the product does not operate properly, do not put into use.
- Warnings and specifications on the product should not be covered by paint, etc. If masking is not possible, contact your local representative for replacement labels.

PRE-INSTALLATION or SERVICE

1. Before servicing a valve or other pneumatic component, be sure that the electrical supply is turned off and that the entire pneumatic system is shut off and exhausted.

2. All ROSS products, including service kits and parts, should be installed and/or serviced only by persons having training and experience with pneumatic equipment. Because any installation can be tampered with or need servicing after installation, persons responsible for the safety of others or the care of equipment must check every installation on a regular basis and perform all necessary maintenance.

3. All applicable instructions should be read and complied with before using any fluid power system in order to prevent harm to persons or equipment. In addition, overhauled or serviced valves must be functionally tested prior to installation and use.

4. Each ROSS product should be used within its specification limits. In addition, use only ROSS parts to repair ROSS products. Failure to follow these directions can adversely affect the performance of the product or result in the potential for human injury.

FILTRATION and LUBRICATION

5. Dirt, scale, moisture, etc. are present in virtually every air system. Although some valves are more tolerant of these contaminants than others*, best performance will be realized if a filter is installed to clean the air supply,* thus preventing contaminants from interfering with the proper performance of the equipment. ROSS recommends a filter with a 5-micron rating for normal applications.

6. All standard ROSS filters and lubricators with polycarbonate plastic bowls are designed for compressed air applications only. Do *not* fail to use the metal bowl guard, where provided, to minimize danger from high pressure fragmentation in the event of bowl failure. Do not expose these products to certain fluids, such as alcohol or liquefied petroleum gas, as they can cause bowls to rupture, creating a combustible condition, hazardous leakage, and the potential for human injury. Immediately replace a crazed, cracked, or deteriorated bowl. When bowl gets dirty, replace it or wipe it with a clean dry cloth.

7. Only use lubricants which are compatible with materials used in the valves and other components in the system. Normally, compatible lubricants are petroleum base oils with oxidation inhibitors, an aniline point between 82 degrees Celsius (180 degrees Fahrenheit) and 104 degrees Celsius (220 degrees Fahrenheit), and an ISO 32, or lighter, viscosity. Avoid oils with phosphate type additives which can harm polyurethane components, potentially leading to valve failure and/or human injury.

AVOID INTAKE/EXHAUST RESTRICTION

8. Do not restrict the air flow in the supply line. To do so could reduce the pressure of the supply air below the minimum requirements for the valve and thereby cause erratic action.

9. Do not restrict a valve's exhaust port as this can adversely affect its operation. Exhaust silencers must be resistent to clogging and have flow capacities at least as great as the exhaust capacities of the valves. Contamination of the silencer can result in reduced flow and increased back pressure.

ROSS expressly disclaims all warranties and responsibility for any unsatisfactory performance or injuries caused by the use of the wrong type, wrong size, or inadequately maintained silencer installed with a ROSS product.

POWER PRESSES

10. Mechanical power presses and other potentially hazardous machinery using a pneumatically controlled clutch and brake mechanism must use a press control double valve with a monitoring device. A double valve without a self-contained monitoring device should be used only in conjunction with a control system which assures monitoring of the valve. All double valve installations involving hazardous applications should incorporate a monitoring system which inhibits further operation of the valve and machine in the event of a failure within the valve.

ENERGY ISOLATION/EMERGENCY STOP

11. Per specifications and regulations, ROSS L-O-X® and L-O-X® with EEZ-ON® operation products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.

GLOBAL Reach with a LOCAL Touch℠

ROSS CONTROLS
Troy, MI., U.S.A.
Telephone: + 1-248-764-1800
Fax: + 1-248-764-1850
In the United States:
Customer Service: 1-800-GET ROSS (438-7677)
Technical Service: 1-888-TEK-ROSS (835-7677)
www.rosscontrols.com

ROSS EUROPA GmbH
Langen, Germany
Telephone: + 49-6103-7597-0
Fax: + 49-6103-74694
Email: info@rosseuropa.com
www.rosseuropa.com

ROSS ASIA K.K.
Kanagawa , Japan
Telephone: + 81-427-78-7251
Fax: + 81-427-78-7256
www.rossasia.co.jp

ROSS UK Ltd.
Birmingham, United Kingdom
Telephone: + 44-121-559-4900
Fax: + 44-121-559-5309
Email: sales@rossuk.co.uk

ROSS CONTROLS INDIA Pvt. Ltd.
Chennai, India
Telephone: + 91-44-2624-9040
Fax: + 91-44-2625-8730
Email: rossindia@airtelbroadband.in

ROSS SOUTH AMERICA Ltda.
São Paulo, Brazil CEP 09725-020
Telephone: + 55-11-4335-2200
Fax: + 55-11-4335-3888
Email: vendas@ross-sulamerica.com.br

DIMAFLUID s.a.s.
Saint Ouen, France
Telephone: + 33-01-49-45-65-65
Fax: + 33-01-49-45-65-30
Email: dimafluid@dimafluid.com
www.dimafluid.com

ROSS CONTROLS (CHINA) Ltd
Shanghai, China
Telephone: + 86-21-6915-7951
Fax: + 86-21-6915-7960
Email: alvinzhurong@vip.163.com

Your local ROSS distributor is:

Warranty

Products manufactured by ROSS are warranted to be free of defects in material and workmanship for a period of one year from the date of purchase. ROSS' obligation under this warranty is limited to repair or replacement of the product or refund of the purchase price paid solely at the discretion of ROSS and provided such product is returned to ROSS freight prepaid and upon examination by ROSS such product is found to be defective. This warranty shall be void in the event that product has been subject to misuse, misapplication, improper maintenance, modification or tampering. THE WARRANTY EXPRESSED ABOVE IS IN LIEU OF AND EXCLUSIVE OF ALL OTHER WARRANTIES AND ROSS EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES EITHER EXPRESSED OR IMPLIED WITH RESPECT TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ROSS MAKES NO WARRANTY WITH RESPECT TO ITS PRODUCTS MEETING THE PROVISIONS OF ANY GOVERNMENTAL OCCUPATIONAL SAFETY AND/OR HEALTH LAWS OR REGULATIONS. IN NO EVENT SHALL ROSS BE LIABLE TO PURCHASER, USER, THEIR EMPLOYEES OR OTHERS FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES WHICH MAY RESULT FROM A BREACH OF THE WARRANTY DESCRIBED ABOVE OR THE USE OR MISUSE OF THE PRODUCTS. NO STATEMENT OF ANY REPRESENTATIVE OR EMPLOYEE OF ROSS SHALL EXTEND THE LIABILITY OF ROSS AS SET FORTH HEREIN.

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